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EASTERN ARCHIPELAGO, PART I.

(EASTERN PART)

THIRD EDITION, 1911.

CAUTION WHEN APPROACHING BRITISH PORTS.

(To be inserted inside cover of all Sailing Directions.)

PART I.—CLOSING OF PORTS.

(1) My Lords Commissioners of the Admiralty having taken into consideration the fact that it may be necessary to forbid all entrance to certain ports of the Empire, this is to give Notice that on approaching the shores of the United Kingdom, or any port of the British Empire, a sharp lookout should be kept for the signals described in the following paragraph, and for the vessels mentioned in paragraph (4), Part II., of this Notice, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) If entrance to a port is prohibited, three *red* vertical lights by night, or three *red* vertical balls by day, will be exhibited in some conspicuous position in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (4), Part II., of this Notice.

If these signals are displayed, vessels must either proceed to the position marked "Examination Anchorage" on the Admiralty Charts and anchor there, or keep the sea.

PART II.—EXAMINATION SERVICE.

(3) Under certain circumstances, it may become necessary to take special measures to examine vessels desiring to enter the ports or localities at home or abroad, referred to in Notices to Mariners No. 1 of 1915 and subsequent years.

(4) In such case, vessels carrying the distinguishing flags or lights mentioned in paragraph (6) will be charged with the duty of examining ships which desire to enter the ports and of allotting positions in which they shall anchor. If Government vessels, or vessels belonging to the local port authority, are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on which they should approach the Examination Anchorage. Such communication will not be necessary in cases where the pilot on board has already received this information from the local authorities.

(5) As the institution of the Examination Service at any port will never be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (6), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

In approaching by night serious delay and risk will be avoided if four efficient all round lamps, two *red* and two *white*, are kept available for use.

(6) By day the distinguishing flags of the Examination Steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign.

Also, three *red* vertical balls if the port is closed.

By night the steamer will carry: (a) Three *red* vertical lights if the port is closed; (b) three *white* vertical lights if the port is open.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(7) Masters are warned that, before attempting to enter any of these ports when the Examination Service is in force, they must in their own interests strictly obey all instructions as to entry given to them by the Examination Steamer. In the absence of any instructions from the Examination Steamer they must proceed to the position marked "Examination Anchorage" on the Admiralty Charts, and anchor there, or keep the sea.

Whilst at anchor in the Examination Anchorage, Masters are warned that they must not lower any boats (except to avoid accident), communicate with the shore, work cables, move the ship, or permit anyone to leave the ship, without permission from the Examination Steamer.

(8) In case of fog, Masters of vessels are enjoined to use the utmost care, and the Examination Anchorage itself should be approached with caution.

(9) Merchant vessels when approaching British Ports are specially cautioned against making use of private signals of any description, either by day or night: the use of them will render a vessel liable to be fired on.

(10) The pilots attached to the ports will be acquainted with the regulations to be followed.



NOTICE.

HYDROGRAPHIC DEPARTMENT, ADMIRALTY.

IN January of each year the information affecting this book, which has been published during the preceding year in the Admiralty Notices to Mariners, is compiled and issued as a separate publication. If a Supplement has been issued during the year, this publication will only include Notices issued since the date of the Supplement. Mariners are advised to procure copies of these publications. They can be obtained gratuitously from the Admiralty Agent or Sub-Agents for the sale of charts on presentation of the coupons on the next page, either personally or by letter. In the latter case the cost of postage must be enclosed.

The Supplements to this book which may be published can also be obtained in a similar manner on presentation of the coupons below.

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PILOT, PART I.,

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PILOT, PART I.,

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H. E. P. O.

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EASTERN ARCHIPELAGO
Part I, No. 1
1911

Revised Supplement to
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Part I, No. 1
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1931

EASTERN ARCHIPELAGO PILOT,

PART I.

(EASTERN PART),

COMPRISING

THE PHILIPPINE ISLANDS (WITH THE EXCEPTION OF
THE WESTERN COASTS OF LUZON AND PALAWAN), SULU SEA,
SULU ARCHIPELAGO, CELEBES SEA, AND THE
NORTH-EAST COAST OF BORNEO.

COMPILED FROM VARIOUS SOURCES.

THIRD EDITION, 1911.

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ADVERTISEMENT TO THE THIRD EDITION.

The Eastern Archipelago Pilot, Part I. (eastern part), contains a description of the coasts of the Philippine islands (except the western coasts of Luzon and Paláwan, which are described in the China Sea Directory, Vol. II., or Vol. IV. of the new series), the Sulu sea, Sulu archipelago, Celébes sea, and the North-east coast of Borneo.

Part II. describes the western portion, and Part III. the south-eastern portion of the Eastern archipelago.

The region described in the present volume, with the exception of Paláwan, was included in the Eastern Archipelago, Part I., originally compiled by Captain J. P. Maclear, R.N., in 1890, from various sources which are mentioned in the Bibliography, in so far as they relate to the coasts and seas within the limits of this work. A second edition, prepared by Captain J. Phillips, R.N., was published in 1902.

A description of the eastern coast of Paláwan and off-lying dangers and islands, taken from the China Sea Directory, Vol. II., 1906, has been included in this volume.

A survey of the coasts of the Philippine islands is in progress, but is still far from completion. The northern portion of the east coast of Luzon, the east coast and part of the north coast of Mindanao, also the south coast of that island between Manangula point and Davao gulf, are unsurveyed, and only approximately laid down, and the same may be said of the east coast of Paláwan; caution is therefore necessary when navigating near these coasts. Some of the other coasts of the islands have not been surveyed in detail. Additional information relating to the coasts and ports of the Philippines is continually being furnished by the American officers serving in those waters.

The present volume, prepared by Captain A. G. Douglas, R.N., contains information gathered from the notices and latest publications issued by the United States authorities at Manila, from the Remark Books of H.M. ships, and other sources; also meteorological tables furnished by the Meteorological Office. Additional information relating to the north-east coast of Borneo has been furnished by Commander F. H. Walter, R.N., 1907-8, and Captain F. C. Learmonth, 1910, H.M.S. *Merlin*, employed in surveying on that coast.

Views have been added to the volume to supplement those on the charts, and it is anticipated that they will prove of service to the mariner.

(4958). Wt. 15456—737/32. 3,000—10/11. T.G.E.

Remarks on the tides of the Philippines, and tables for finding the time and height of high water at certain ports, will be found in Appendix I.; particulars of dry docks and patent slips in Appendix II.; and information relating to the depth of water and rise of tide at certain ports in Appendix III.

Seamen are invited to transmit to the Secretary of the Admiralty notice of any errors or omissions they may detect in this work, and also any fresh information they may obtain, that it may be applied for the benefit of navigation.

By the publication of this work, the second edition of the Eastern Archipelago, Part I. (eastern part), 1902, Revised Supplement, 1909, and all Notices to Mariners relating to that work up to and including No. 1,314, of 1911, are cancelled.

H. E. P.-C.

*Hydrographic Office,
Admiralty, London,
12th October, 1911.*

CONTENTS.

	Page
Advertisement - - - - -	iii.
Table of Contents - - - - -	v.
Bibliography - - - - -	vii.
Glossaries - - - - -	ix.
System of Orthography - - - - -	xi.
Information relating to Charts, Sailing Directions, and the General Navigation of H.M. Ships - - - - -	xv.
Definitions - - - - -	xxx.
Index Chart - - - - - facing page	1

CHAPTER I.

General remarks - - - - -	1-10
Winds and weather; revolving storms; gales - - - - -	10-18
Currents and tides - - - - -	18-21
Coal; communication - - - - -	21
Passages - - - - -	21-27
Uniform system of buoyage - - - - -	28

CHAPTER II.

South-west coast of Luzon; Lubang islands - - - - -	29-35
West coast of Mindoro; Mindoro strait - - - - -	35-47
Kalamianes group - - - - -	47-58
Islands north-east of Paláwan - - - - -	59-61
Sulu sea; Cuyos islands; Kagayan Sulu - - - - -	61-78
East coast of Paláwan - - - - -	79-112

CHAPTER III.

BALÁBAC STRAIT AND NORTH-EAST COAST OF BORNEO.

Islands and channels between Paláwan and Borneo - - - - -	113-141
Marudu bay; Banguuey South channel - - - - -	142-157
Mallawallé channel; Sandakan; Dent haven - - - - -	157-180
Sibutu islands and passage - - - - -	180-186
Darvel bay; Sibuko bay - - - - -	186-238

CHAPTER IV.

SULU ARCHIPELAGO.

Samboanga; Basilan strait - - - - -	239-246
Sulu archipelago; Basilan group; Samales group - - - - -	246-257
Sulu group; Tapul group - - - - -	257-274
Tawi Tawi group; Pangutarang group - - - - -	274-296

CHAPTER V.

Verde island passage to Iloilo, western route	-	-	-	Page 297-335
---	---	---	---	-----------------

CHAPTER VI.

Verde island passage to Iloilo, eastern route	-	-	-	336-368
---	---	---	---	---------

CHAPTER VII.

Negros island; Sebu island	-	-	-	-	-	369-402
Bohol island; Leite, W. and S. coasts	-	-	-	-	-	402-418
Mindanao, N.E. coast; Surigao strait	-	-	-	-	-	418-430
Mindanao, north and west coasts	-	-	-	-	-	431-454

CHAPTER VIII.

VERDE ISLAND PASSAGE TO SAN BERNARDINO STRAIT AND HANABATAS CHANNEL.

South coast of Luzon; Marinduque and Burias islands	-	-	455-481
South coast of Luzon; Tikao and Masbate islands	-	-	481-496
Islands between Masbate and Samar	-	-	496-497
Leite, west and north coasts	-	-	497-503
San Bernardino strait; Samar N.W., North and West coasts	-	-	503-525

CHAPTER IX.

EASTERN COASTS OF THE PHILIPPINE ISLANDS.

North and east coasts of Luzon	-	-	-	-	-	526-603
--------------------------------	---	---	---	---	---	---------

CHAPTER X.

EASTERN COASTS OF THE PHILIPPINE ISLANDS.

East and south coasts of Samar; San Juanico strait	-	-	604-635
Leite, east coast; Mindanao, north-east and east coasts	-	-	635-644

CHAPTER XI.

CELEBES SEA, BASILAN STRAIT TO MOLUCCA PASSAGE.

South coast of Mindanao	-	-	-	-	-	645-712
-------------------------	---	---	---	---	---	---------

Meteorological tables	-	-	-	-	-	713-714
-----------------------	---	---	---	---	---	---------

Appendix I.—Tides in the Philippine islands; tables for finding time and height of high water in Manila bay, at Balábac and Iloilo; tables for finding time and height of high water on the south coast of Mindanao	-	-	-	-	-	715-721
---	---	---	---	---	---	---------

Appendix II.—Particulars of Dry docks, patent slips, &c.	-	-	-	-	-	722
--	---	---	---	---	---	-----

Appendix III.—List of principal ports, showing particulars of depths, &c.	-	-	-	-	-	723-724
---	---	---	---	---	---	---------

Index	-	-	-	-	-	725-799
-------	---	---	---	---	---	---------

List of Sailing Directions, &c., published by the Hydrographic Department of the Admiralty	-	-	-	-	-	801-806
--	---	---	---	---	---	---------

Agents for the sale of Admiralty charts	-	-	-	-	-	807-808
---	---	---	---	---	---	---------

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GLOSSARIES OF WORDS OCCASIONALLY FOUND IN THE CHARTS AND SAILING DIRECTIONS.

MALAY.

Malay.	English.	Malay.	English.
Alang Alang -	Reeds.	Manuk - - -	Bird.
Angin - - -	Wind.	Masin - - -	Salt.
Api - - -	Fire.	Mesigit or Missigit -	Mosque.
Arang - - -	Coal.	Muara - - -	Mouth of a river.
Arus - - -	Current.	Napo - - -	Reef.
Ayer - - -	Water.	Negri - - -	Town.
— masin -	Salt water.	Nipa - - -	Small marsh palm.
— pasang -	Flood or high tide.	Nusa - - -	Island.
— surut -	Ebb or low tide.	Padi - - -	Rice in the straw.
— tawar -	Fresh water.	Padoman - - -	Mariner's compass.
Baharu - - -	New.	Panjang - - -	Long.
Bambu - - -	Bamboo cane.	Pantei - - -	Coast, seaboard.
Barat - - -	West.	Pasang besar -	High tide.
Batu - - -	Rock, stone.	— kring -	Low tide.
Batu Arung -	Coal.	— naik -	Flood tide.
Besar - - -	Large, great.	— surut -	Ebb tide.
Besi - - -	Iron.	— turun -	
Beting - - -	Shoal, sand.	Pasir - - -	Sand, shoal.
Buluh - - -	Bamboo cane.	Pelabuan - - -	Anchorage.
Burung - - -	Bird.	Pingir Laut -	Coast, seaboard.
Buwah - - -	Fruit.	Pisang - - -	Banana.
Chettek - - -	Shallow.	Pohon or Puhun -	Tree.
Daging-Sapi -	Beef.	Prau, prahu -	Boat, ship.
Dalam or Dalem -	Deep.	Pulo - - -	Island.
Dammar - - -	Gum.	Putih - - -	White.
Darat - - -	Coast, land.	Renda - - -	Low.
Dessa - - -	District with villages.	Rotan - - -	Rattan cane.
Djemara-boom -	Casuarina tree.	Roti - - -	Bread.
Gunong - - -	Mountain.	Ruma - - -	House.
Gusong - - -	Reef of rocks.	Salatan - - -	South.
Ikan - - -	Fish.	Sampan - - -	Small boat.
Itam - - -	Black.	Sawuh - - -	Anchor.
Jalan - - -	Road.	Sayuran - - -	Vegetables.
Jambatan - - -	Mole, jetty.	Selat - - -	Channel, strait.
Jankar - - -	Anchor.	Si - - -	A particle inseparably united to nouns, and denoting familiarity.
Kalapa or Kelapa -	Cocoanut.	Sungi - - -	River.
Kaler - - -	North.	Tali - - -	Cable.
Kali - - -	River.	Tanah - - -	Land.
Kampung - - -	Village.	Tanjong - - -	Cape, point.
Kapal - - -	Ship.	Tebu - - -	Sugar cane.
Karang - - -	Coral.	Tedoh - - -	Calm.
Kawala - - -	Mouth of a river.	Telok or Teluk -	Bay.
Kayu - - -	Tree.	Tepilaut - - -	Coast, seaboard.
Kechil - - -	Little, small.	Tida Angin - -	Calm.
Kering - - -	Dry.	Timur - - -	East.
Kidul - - -	South.	Titian - - -	Mole, jetty.
Kotta - - -	Town.	Tohor - - -	Shallow.
Kring - - -	Dry.	Toko - - -	Store.
Kroon-boom -	Tree, round top.	Trepang - - -	Bêche-de-mer.
Kulon - - -	West.	Trumbu - - -	A dangerous hidden shoal.
Kupal-boom -	Tree, dome top.	Trusan - - -	Channel.
Labuan - - -	Anchorage.	Tuwak - - -	Old.
Lama - - -	Old.	Ujong - - -	Cape, point.
Laut - - -	Sea.	Utara - - -	North.
Layar - - -	Sail.	Wetan - - -	East.
Lor - - -	North.		
Lumpar or Lumpur	Mud.		

TAGALA.

Tagala.	English.	Tagala.	English.
Abaca - - -	Manila hemp.	Kelong - - -	A large oyster.
Agos - - -	Current.	Kilong - - -	Fish stakes.
Apui - - -	Fire.	Kima - - -	A large clam.
Asin - - -	Salt.	Kitir - - -	Strait.
Baibai - - -	Coast, seaboard.	Kogon - - -	A reed used for roofing houses.
Bakal - - -	Iron.	Kogonal - - -	A thicket or plantation of Kogon.
Balai - - -	House.	Kota - - -	Fort.
Balangai - - -	Ship.	Layag - - -	Sail.
Balate - - -	The Indian fig.	Losak - - -	Mud.
Balete - - -	Bêche-de-mer.	Luk - - -	Bay.
Bantiki - - -	A tree resembling olive.	Lupa - - -	Land.
Bato - - -	Rock, stone.	Mababa - - -	Low.
Bayan - - -	Town.	Mababao - - -	Shallow.
Bohangin - - -	Sand.	Mahaba - - -	Long.
Bondog - - -	Mountain.	Maitim - - -	Black.
Bunga - - -	Fruit.	Malaki - - -	Large, great.
Carey - - -	Turtle shell.	Malalim - - -	Deep.
Daan - - -	Road.	Munti - - -	Little, small.
Dagat - - -	Sea.	Niyog - - -	Cocoanut.
— hibus - - -	Ebb tide.	Ongot - - -	Cape, point.
— laki - - -	Flood tide.	Palai - - -	Rice in the straw.
— tagas - - -	Low tide.	Pantalan - - -	Mole, jetty.
Darung - - -	Ship.	Poio - - -	Island.
Habagat - - -	South.	Saguing - - -	Banana.
Hangin - - -	Wind.	Salanganes - - -	Edible bird's nests.
Hilaga - - -	North.	Sao - - -	Anchor.
Ibon - - -	Bird.	Sibukao - - -	Sappan wood.
Ilog - - -	River.	Silangan - - -	East.
Ilogan - - -	Mouth of a river.	Takut - - -	Shoal, sand.
Isda - - -	Fish.	Talisai - - -	A useful tree— <i>Terminalia</i> <i>Catappa</i> .
Kahui - - -	Tree.	Tubig - - -	Water.
Kalinauan - - -	Calm.	Tubu - - -	Sugar cane.
Kalonoran - - -	West.	Tuyo - - -	Dry.
Kapis - - -	Pearl shell.		
Karei - - -	Turtle shell.		
Kauayan - - -	Bamboo cane.		
Kauit - - -	A creek, bend, hook; frequently employed to name a point.		

BISAYAN.

Bisayan.	English.	Bisayan.	English.
Alimpaya - - -	Tide race, eddies.	Kauit - - -	A creek, bend, hook; frequently employed to name a point.
Balate - - -	The Indian fig.	Kogon - - -	A reed used for roofing houses.
Balete - - -	Bêche-de-mer.	Kogonal - - -	A thicket or plantation of Kogon.
Bantiki - - -	A tree resembling olive.	Kolasi - - -	A resinous tree.
Carey - - -	Turtle shell.	Talisai - - -	A useful tree— <i>Terminalia</i> <i>Catappa</i> .
Dako - - -	Great.		
Karei - - -	Turtle shell.		

MORO.

Moro.	English.	Moro.	English.
Kasiran - - -	Native paddy.	Parido - - -	Small.
Masila - - -	Great.	Sugur - - -	A bay.

SYSTEM OF ORTHOGRAPHY

Adopted by the Admiralty for Sailing Directions and Charts.

As far as has been found possible with existing knowledge, native names are spelt in accordance with the following system, which has been adopted by the principal authorities in Great Britain, and by the United States, and has been for some years in process of gradual introduction into all Admiralty Sailing Directions and Charts.

No change is made in the orthography of foreign names in countries which use Roman Letters ; thus French, Spanish, Portuguese, Dutch, &c., names will be spelt as by the respective nations.

1. Where native names have been so long written in a form which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained.

2. The true sound of the word as locally pronounced is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system which would attempt to represent the more delicate inflections of sound and accent would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English, *every letter being pronounced*. Two accents only are used :—

(1.) The acute, to denote the syllable on which stress is laid. The use of this is very important, as the sounds of many names are entirely altered by the misplacement of this “stress.”

(2.) The sign ~ over the letter U to denote the short sound of that vowel under certain circumstances. (See table.)

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai, au, ei*.

The amplification of the rules is given below.

Information is invited as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system.

Letters.	Pronunciation and Remarks.	Examples.
a	ah, a as in <i>father</i> - - - - -	Java, Banána, Somáli, Bari.
e	eh, e as in <i>bet</i> ; a as in <i>fate</i> - - - - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English e ; i as in <i>ravine</i> ; the sound of ee in <i>beet</i> . Thus, not <i>Feejee</i> , but	Fiji, Hindi.
o	o as in <i>mote</i> - - - - -	Tokyo.
u	long u as in <i>flute</i> ; the sound of oo in <i>boot</i> . oo or ou should never be employed for this sound. Thus, not <i>Zooloo</i> or <i>Zoulou</i> , but	Zulu, Sumatra.

Letters.	Pronunciation and Remarks.	Examples.
	The shorter sound of the different vowels, when necessary to be indicated, can be expressed by doubling the consonant that follows. The sounds referred to are as follows :— The short <i>a</i> as in <i>fatter</i>, as compared with the long <i>a</i> as in <i>father</i>. The short <i>e</i> as in <i>better</i>, as compared with the long <i>e</i> as in <i>me</i>. The short <i>i</i> as in <i>sinner</i>, as compared with the long <i>i</i> as in <i>wine</i>. The short <i>o</i> as in <i>sobbing</i>, as compared with the long <i>o</i> as in <i>sober</i>. The short <i>u</i> as in <i>rubber</i>, as compared with the long <i>u</i> as in <i>rubric</i>.	Yarra, Tanna, Mecca, Jidda, Bonny.*
ũ	is the same short sound of <i>u</i> as is denoted by doubling the consonant following, but is used, and only used, where such doubling is impossible, as in case of words where <i>u</i> is followed by two different consonants, as in <i>Tũng</i>, pronounced as the English <i>tongue</i>. Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulũa, Oosima.
ai	English <i>i</i> as in <i>ice</i> - - - -	Shanghai.
au	<i>ow</i> as in <i>how</i> - - thus, not <i>Foochow</i> , but	Fuchau.
ao	is slightly different from <i>au</i> - - - -	Macao.
aw	when followed by a consonant or at the end of a word as in <i>law</i> - - - thus	Cawnpore.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from <i>ey</i> in the English <i>they</i> , or <i>ei</i> in <i>eight</i> .	Beirũt, Beilul.
b	English <i>b</i> .	
c	is always soft, but is so nearly the sound of <i>s</i> that it should be seldom used. If <i>Celẽbes</i> were not already recognised it would be written <i>Selẽbes</i>.	Celẽbes.
ch	is always soft as in <i>church</i> - - - -	Chingchin.
d	English <i>d</i> .	
f	English <i>f</i> . <i>Ph</i> should not be used for the sound of <i>f</i> . Thus, not <i>Haiphong</i> , but	Haifong, Nafa.
g	is always hard. (Soft <i>g</i> is given by <i>j</i>) -	Galapagos.
h	is always pronounced when used.	
hw	as in <i>what</i> , better rendered by <i>hw</i> than <i>wh</i> , or <i>h</i> followed by a vowel. Thus, <i>Hwang ho</i> , not <i>Whang ho</i> or <i>Hoang ho</i> .	Hwang ho, Ngan hwei.
j	English <i>j</i> . <i>Dj</i> should never be put for this sound.	Japan, Jinchuen.

* The *y* is retained as a terminal in this word under Rule 1. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
k	English <i>k</i> . It should always be put for the hard <i>c</i> . Thus, not <i>Corea</i> , but	Korea.
kh	The Oriental guttural - - - - -	Khan.
gh	is another guttural, as in the Turkish -	Dagh, Ghazi.
l	} As in English.	
m		
n		
ng	has two separate sounds, the one hard as in the English word <i>finger</i> , the other as in <i>singer</i> . As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in <i>loophole</i> - - - - -	Mokpho, Chemulpho.
th	stands both for its sound in <i>thing</i> , and as in <i>this</i> . The former is most common -	Bethlehem.
q	should never be employed ; the sound of <i>qu</i> in <i>quiver</i> is given as <i>kw</i> . When <i>qu</i> has the sound of <i>k</i> , as in <i>quoit</i> , it should be given by <i>k</i> .	Kwangtung.
r	As in English.	
s	As in <i>sin</i> .	
sh	} As in English.	
t		
v		
w		
x		
y	is always a consonant, as in <i>yard</i> , and therefore should never be used as a terminal, <i>i</i> or <i>e</i> being substituted. Thus, not <i>Mikindány</i> or <i>Wady</i> , but not <i>Kwaly</i> , but	Kikuyu. Mikindáni, Wadi. Kwale.
z	English <i>z</i> - - - - -	Zulu.
zh	French <i>j</i> , or as <i>s</i> in <i>treasure</i> - - - - -	Muzhdaha.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an <i>acute</i> accent.	Tongatábu, Galápagos, Paláwan, Saráwak.

In the case of native names in countries under the dominion of other European powers, in whose maps, charts, &c., the spelling is given according to the system adopted by that power, such orthography is, as a rule, disregarded, and the names are spelt according to the British system. Thus the island east of Java in possession of the Dutch is spelt Madoera by them, but on Admiralty charts Madura. A town in Java appears on Dutch charts as Tjilatjap ; in the British, Chilachap.

The phonetic value of vowels in Oriental languages is given below, but the accents have been omitted to be used in this work.

a.....	as the.....	u.....	in but.
ā.....	„	ā.....	in father.
e.....	„	ai.....	in fail.
i.....	„	i.....	in hit.
ī.....	„	ee.....	in cheese.
o.....	„	o.....	in bold.
u.....	„	oo.....	in wood.
ū.....	„	oo.....	in fool.
ai.....	„	ai.....	in aisle.
au.....	„	ou.....	in loud.

In other combinations of vowels they should be pronounced separately on the above principles.

When a foreign language is written in a vocabulary of fixed sounds, so as to permit of transliteration into the British system, a table of equivalents for each letter is drawn up, and names of places can be transliterated without regard to pronunciation.

To reduce Greek names to the orthographic form, required by the foregoing system, would require so many changes that it has been decided to defer the revision of Admiralty publications until the system has been more generally introduced and used.

The Greek names are therefore left for the present in their old shape, but these give in most cases a very erroneous idea of the sound of the names, as pronounced by Greeks, and in many cases the modern Greek spelling gives a clue to the pronunciation by aid of the table of equivalents.

Thus *Ευβοια* now spelt *Eubœa* is pronounced *Evvia*.

„ *Χαλκίς* „ *Chalcis* „ *Khalkis*.

„ *Κεφαλληνία* „ *Cephallonia* „ *Kefallinia*.

Whenever C appears in a Greek name as at present written it may be taken for granted it has the sound of K.

Greek Letters	Roman Equivalents by Admiralty System	Greek Letters	Roman Equivalents by Admiralty System
Α α	a	Ρ ρ	r
Β β	v	Σ σ ς	s
Γ γ	g	Τ τ	t
Δ δ	d	Υ υ	i
Ε ε	e	Φ φ	ph
Ζ ζ	z	Χ χ	kh
Η η	i	Ψ ψ	ps
Θ θ	th	Ω ω	o
Ι ι	i	ΑΙ αι	ei
Κ κ	k	ΕΙ ει	i
Λ λ	l	ΟΙ οι	i
Μ μ	m	ΟΥ ου	u
Ν ν	n	ΥΙ υι	i
Ξ ξ	x	ΑΥ αυ	aph, av
Ο ο	o	ΕΥ ευ	eph, ev
Π π	p	ΗΥ ηυ	iph, iv

INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, SAILING DIRECTIONS, AND LIGHT LISTS.

THE three descriptions of publications as guides to navigation, which are affected by the continual changes and alterations that take place, are the Charts, the Sailing Directions, and the Light Lists.

Of these the Charts should always be, so far as our knowledge permits, absolutely correct to date; the Sailing Directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the largest scale chart must be taken as the guide for navigation.*

The Light Lists are corrected annually.

1. *Charts*.—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Department they are correct to the date of issue as stamped on each folio. They then receive such corrections by hand in the dépôts as are required, and are so issued to the ships.

The charts in the folios should have the same number and title as shown against each in the Lists pasted on the outside of the folio. The Navigating Officer is to satisfy himself that they do so agree before signing the receipt for the charts, &c.

All small but important corrections affecting navigation that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer, in accordance with the following uniform system:—

1. All corrections, additions to, or erasures on charts are to be neatly made in *red* (except as explained later in paragraph 6). In every case the recognised chart abbreviations are to be used.

2. The number and date of every Notice to Mariners, from which corrections, &c., as above have been made, are to be entered at the lower left-hand corner of the chart, in *red*, in the following manner, viz.:—

07 . 123, 1145, 1503; 08 . 232; 10 . 1506, 1721; 11 . 34, &c.

3. The *amount* of the substance of a Notice to Mariners inserted on the chart should as a general rule be limited to what is likely to be engraved on the chart plate when corrected in office, and it should also be inserted as far as possible in a similar style; thus:—

- (a) the amount of information to be inserted depends on the scale of the chart, and should be in accordance with that already engraved on the chart. On the largest scales will generally be found all the principal details of lights and their sectors, buoys, &c. On the smallest scales buoys are seldom inserted, and lights are only briefly described as Lt. F., Lt. Gp. Fl., Red, &c., &c., without any details, as to height, visibility, periods, &c.;
- (b) when inserting corrections, care must be taken not to obliterate any of the other information already on the chart;
- (c) wrecks are shown thus, /// "Wreck," and on large scales the "year" is added;

(d) when "Notes" are to be inserted (such as Cautionary, Tidal, &c.) they should be written in a convenient but conspicuous place, where they will not interfere with any other details.

4. The numbers and dates of Notices should *not* be entered on the Charts, except as required by paragraph 2, as they only tend to the increase of illegibility.

5. Erasures, when necessary, should consist of a single line made with a pen. A knife or ink eraser should not be used.

6. Temporary or intended changes should be inserted on the chart in pencil, and in the latter case finally inked in, in red, when further notice has been received confirming the previous one.

7. One copy of each Notice to Mariners should be pasted into the Sailing Directions in its appropriate place, so that, if fuller detail is required than what the scale of the chart permits to be given, it may be found on the proper page referring to the given locality or subject.

When these corrections are so large that they cannot be conveniently thus made they are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which these large corrections are made are noted on the chart plates under the heading of "New Editions" in the middle of the lower edge; those of the smaller corrections at the left-hand lower corners as "Small Corrections."

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (which will be found in the lower right-hand corner), in order that at the Admiralty it may be known what edition of the chart is referred to, and to what date the chart has been corrected.

It should be remembered that in addition to the large and small corrections here mentioned, the chart plates are being constantly corrected for numerous details not considered to be of such a nature as to affect safe navigation. For these corrections the charts are not necessarily dated, nor are any Notices to Mariners issued, and it follows therefore that two charts, both bearing the same dates of "New Editions" and "Small Corrections," may not exactly agree in all respects.

2. *The Sailing Directions* are not corrected before issue, but on page iii. in the "Advertisement" to each volume will be found the number of the last Notice to Mariners used in its revision, the numbers of the subsequent Notices affecting it between going to press and issue to H.M. Ships are given in the Notice to Mariners announcing its publication.

Supplements and Revised Supplements referring to each volume are published from time to time. Supplements contain all the information received up to date since the publication of the volume to which they refer, and a Revised Supplement cancels the previous Supplements.

The existence of a Supplement is to be noted in the tabular form placed for the purpose inside the cover of each volume, and also on receipt of a further Revised Supplement after commission. Two copies are issued to each ship, one of which is to be retained intact, for reference, notations referring to it being made on the pages of the Sailing Directions affected; the other copy may be cut up, if considered desirable, the slips being pasted in the volume at the appropriate place.

In the advertisement to each Supplement will be found the number of the last Notice to Mariners used in its compilation.

In January of each year, a summary of the information affecting each volume of Sailing Directions, which has been published during the preceding year in Notices to Mariners, is issued in a separate publication. If a Supplement or Revised Supplement has been issued during the year, this summary will only include Notices to Mariners issued since the date of such Supplement; if one is in preparation at the end of the year, no summary will be issued. These summaries are only issued to H.M. Ships with the books to which they refer.

An early duty of the Navigating Officer after drawing a chart set is to correct the Sailing Directions from the Supplements or Revised Supplements, Annual Summaries of Notices to Mariners and Notices to Mariners supplied with the chart set.

As Notices to Mariners prior to the date of issue of a chart set from the Hydrographic Department are not supplied with the set, he should demand from that Department such Notices to Mariners as are required to complete the interval between the last published Supplement, Revised Supplement, or Summary of Notices to Mariners, and the first number of the Notices to Mariners drawn with the chart set.

One copy of each Notice to Mariners should be pasted into the Sailing Directions in its appropriate place as soon as received.

It must, however, be thoroughly understood that Sailing Directions will never be correct in all minor details, except up to the date of the last Supplement or Revised Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

3. *The Light Lists*, annually published at the beginning of each year, are not corrected in the dépôts before issue, but appendices are issued every week with the weekly copies of Notices to Mariners, giving the alterations that have taken place.

It is the duty of the navigating officer when he receives the set of charts to make notations in the Light Lists from these appendices, and from Notices to Mariners of later date; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions does not embrace the sectors, and the other information on the lights may be obsolete, in consequences of changes made since publication. A red label to this effect is inserted opposite page 1 of all Sailing Directions. The charts also may not be equally up-to-date in some details, for which no Notices to Mariners have been issued.

THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Reliance on a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that

precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of Coast sheets, which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the only method of ascertaining the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends it only ascertains the depth of water over an area equal to the diameter of the lead, that is about two inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a width of two inches.

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instances, a general survey of a coast which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor, are made on a scale of three inches to the mile, and surveys of frequented ports, or harbours likely to be used by Fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale Coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, *i.e.*, of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper:—

16	15	15	13	13	14	12	11	10	9
14	15	14	13	13	12	11	9	8	
15	15	14	17	16	14	13	10	10	9
16	16	17	18	16	12	11	8½	9	10
16	17	15	12	9	7½	7½	7½	9	10
19	16	12	9	5½	4½	5½	6½	8½	9
22	19	16	10	5½	5½	6½	7½	8½	10
20	16	12	7½	5½	6½	6½	7½	8½	10
18	15	11	9	7½	7	7½	8½	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear weather, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may occasionally escape detection.

Lines of soundings plotted as close as may be practicable on a scale of 6 inches to the mile would be 100 feet apart, and each line would be only 2 inches in actual width.

Thus, in a chart on a scale of 1 inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape the lead; whilst in a chart on a scale of 6 inches, inequalities as large as battle-ships, if lying parallel to, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General Coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the contour line of 10 fathoms, without taking every precaution to avoid a possible danger; and even with surveys of harbours on a scale of 6 inches to the mile, vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead will not rest on them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear, unless it is shown to be foul, the contrary should be assumed.**

2. Fathom Lines a Caution.—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, as before mentioned, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. Chart on largest scale always to be used.—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

4. Caution in using Small Scale Charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. Graduation.—All Plans are now being graduated in skeleton style before publication in order to facilitate easy reference to Astronomical positions; previously published plans are also graduated as opportunity offers. The graduation is, however, of necessity, often based upon imperfect information of a conflicting nature; for this reason, whenever an Astronomical position is quoted other than approximate (*i.e.*, when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived.

6. Distortion of Printed Charts.—The paper on which charts are printed has to be damped. On drying, distortion takes place from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion.

7. Buoys.—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

Gas Buoys.—The lights shown by gas buoys cannot be implicitly relied on, as, if occulting or flashing, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British islands are from 5 to 217 candle power.

8. Lights.—Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height, at the end of

each Light List affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, or candle power, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See table in Light List before mentioned.*)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

9. Fog Signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the fog signal station, in some instances even when in close proximity to it. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a station until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be made. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck. Under certain conditions of the atmosphere, when a fog signal is a combination of high and low notes, one of the notes may be inaudible.

The mariner should not assume—

- a. That, because he fails to hear the sound, he is out of hearing distance.
- b. That, because he hears a fog signal faintly, he is at a great distance from it.
- c. That, because he hears the sound plainly, he is near it.
- d. That, because he does not hear it, even when in close proximity, the fog signal has ceased sounding.
- e. That the distance from and the intensity of the sound on any one occasion, are a guide to him for any future occasion.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

10. *Tides and Tidal Streams.*—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off-shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by about three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, "Table B, for finding the height of tide at any intermediate hour between high and low water," and diagrams, given in the Tide Tables, will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low-water ordinary springs. This always occurs on the coasts of Europe at the equinoxes, but in other parts of the world and especially in the tropics, such periodic low tides may coincide more frequently with the solstices. Wind or a high barometer may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

11. *Arrows* on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

12. *Fixing position.*—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are supplied with a station-pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment: First, that the objects be well chosen; and, second, that the observer is skilful and rapid in his use of the sextant and station-pointer.

For the former, reference can be made to the pamphlet on the use of the station-pointer, which is in every chart box: the latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or gun-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in

either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart of fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart, as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, allowing for current, gives an excellent fix for a departure but does not ensure safety, as the point and probably the rocks off it are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current.

This is, however, only strictly true if the current is directly with or against the course of the ship. If a cross current has to be allowed for, the results by this method may be altogether erroneous and misleading. The following example shows in a tabular form the errors that might be produced by accepting the distance run in the interval, allowing for current, as the distance of the object at time of second bearing.

Example: A vessel steering East sights a light bearing E.N.E., or two points on the bow; one hour after, having run in the interval 10 miles by log, the light bears N.E., i.e., she has doubled the angle on the bow. Current, in all cases, at the rate of 2 miles an hour.

Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing	Direction of Current	Distance run between 1st & 2nd Bearings		Distance of Light at 2nd Bearing
	By Log	Allowing for Current			By Log	Allowing for Current	
	Miles	Miles	Miles		Miles	Miles	Miles
East . .	10	12	12	West . .	10	8	8
E.N.E. .	10	11.8	10	W.S.W. .	10	8.2	10.2
N.E. . .	10	11.4	8	S.W. . .	10	8.7	11.9
N.N.E. .	10	11	6.2	S.S.W. .	10	9.4	13.6
North . .	10	10.2	5.3	South . .	10	10.2	14.7
N.N.W. .	10	9.4	4.9	S.S.E. .	10	11	15
N.W. . .	10	8.7	5.3	S.E. . .	10	11.4	14.7
W.N.W. .	10	8.2	6.1	E.S.E. .	10	11.8	13.8

The following rule should be observed in all cases of a cross current, viz. :—

When the angle between the second bearing and the course made good (over the ground) is double the angle between the first bearing and the course made good (over the ground) the distance from the object is equal to the distance made good (over the ground) between the times of the first and second bearings.

To get a reliable result the difference between the first bearing and the course made good (over the ground) should never be less than 20° . It follows, therefore, that it is necessary, before observing the first bearing, to decide upon the course being made good (over the ground). This may be done as follows, viz. :—

From any point, A, on the chart draw a line A B, representing by its direction the course steered and by its length the speed through the water. From the point B, draw another line, B C, representing in a similar manner the estimated direction and rate of the current, &c., to be allowed for. Then a line joining the points A and C will represent in the same manner the course and speed which are being made good (over the ground).

A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is supplied with all chart sets.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, i.e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude or longitude) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. A deep cast of the lead at the same time may often serve to give an approximate position on the line. An early and very accurate position can also be obtained by Sumner's method, by getting a Sumner line by a bright star at daylight when the horizon is well visible, and another Sumner line by the sun when a few degrees above the horizon, or, better still, by observing two or more stars at twilight. The Sumner lines thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

13. Change of Variation of the Compass.—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are

long the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles, and in the English Channel about 5° in 400 miles. The Variation Chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation Chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses.

14. *Local Magnetic Disturbance of the Compass on board Ship.*—

The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

It is very desirable that, whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

15. *Use of Oil for Modifying the Effect of Breaking Waves.*—

Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing

else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides; if used only aft the tow alone gets the benefit.

16. *Concise Rules for Revolving Storms:—*

1. Revolving storms are so named because the wind in these storms revolves round an area of low pressure situated in the centre. They have also local names, and are termed hurricanes in the West Indies and South Pacific Ocean; cyclones in the Indian Ocean, Bay of Bengal, and Arabian Sea; and typhoons in the China Sea.

2. In these storms the wind always revolves the same way in the same part of the world, that is, against the movement of the hands of a watch in the northern hemisphere, and with the hands of a watch in the southern hemisphere. The wind does not revolve in circles, but has a spiral movement, inwards, towards the centre.

3. Revolving storms have also, as a general rule, a progressive movement. Within the tropics they usually move from east to west at first, and then curve towards the pole of the hemisphere in which the storm is generated, and afterwards move from west to east.

4. The track which the centre of the storm takes is called the path of the storm, and the portion of the storm-field on the right of the path is known as the right-hand semicircle, and that on the left as the left-hand semicircle of the storm.

5. In the right-hand semicircle, if the observer be stationary, the wind will always shift to the right, and in the left-hand semicircle to the left. This law holds good in both hemispheres.

6. If a vessel be so situated in a storm that running before the wind the path of the advancing storm will be crossed, this is considered to be the dangerous semicircle. This will always be the right-hand semicircle in the northern hemisphere, and the left-hand in the southern.

7. These storms are most frequent in the northern hemisphere from July to November, and in the southern hemisphere from December to May. In the Bay of Bengal and Arabian Sea they, however, occur most frequently about the time of the change of the monsoon.

8. The area over which revolving storms have been known to extend varies in diameter from 20 miles to some hundreds of miles, and their rate of movement in the West Indies averages about 300 miles a day; in the China Sea, Bay of Bengal, and Arabian Sea about 200 miles a day; and in the Indian Ocean from 0 to 200 miles a day, the more stationary storms occurring at the beginning and end of the hurricane season.

9. The indications of the approach of a revolving storm are (1) an unsteady barometer, or even a cessation in the diurnal range, which is constant in settled weather; (2) a heavy swell not caused by the wind then blowing; (3) an ugly, threatening appearance of the sky.

10. In order to judge what is the best way to act if there is reason to believe a storm is approaching, the seaman requires to know (a) in which direction the centre of the storm is situated, (b) in which semicircle the ship is situated.

11. As these points cannot be determined if a vessel is moving with any speed through the water, the first proceeding should be to "stop" or "heave to," and, as it is always best to assume, at first, that the vessel may be in the dangerous semicircle, she should be hove to on the starboard tack in the northern hemisphere, and on the port tack in the southern.

12. If an observer faces the wind the centre of the storm will be from 12 to 8 points on his right hand in the northern hemisphere, and on his left hand in the southern hemisphere; 12 points when the storm begins; about 10 points when the barometer has fallen three-tenths of an inch, and about 8 points when it has fallen six-tenths of an inch or upwards.

13. If the wind shifts to the right the vessel is in the right-hand semicircle, if to the left in the left-hand semicircle, and, if the wind

is steady in direction, but increasing in force, she is in the direct path of the storm.

14. If the seaman has reason to think that his vessel is in the direct path of the storm he should run with the wind on the starboard quarter in the northern, and on the port quarter in the southern, hemisphere until the barometer has ceased falling. If she is in the right-hand semicircle in the northern hemisphere she should remain hove to on the starboard tack, but if in the southern hemisphere run with the wind on the port quarter; if she is in the left-hand semicircle in the northern hemisphere she should run with the wind on the starboard quarter, but if in the southern hemisphere remain hove to on the port tack.

15. Should a vessel not have sufficient room to run when in the least dangerous semicircle, she should heave to on the port tack in the northern, and on the starboard tack in the southern, hemisphere.

16. If in a harbour or at anchor the seaman should be just as careful in watching the shifting of the wind and ascertaining the direction of the centre, as by so doing he will be able to tell on which side of the path of the storm he is situated, and be able to act according to circumstances.

17. Should the centre of a storm pass over a vessel, the wind, after blowing furiously in one direction, ceases for a time, and then blows with equal fury from the opposite direction. This makes a confused pyramidal sea, which is especially dangerous.

**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC,
EXCEPT WHERE MARKED AS TRUE.**

**THE LATITUDES AND LONGITUDES GIVEN IN THE
TEXT ARE APPROXIMATE.**

**THE VARIATION GIVEN IN THE SEVERAL PAGES IS
FOR THE YEAR 1911.**

THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.**

**A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100
FATHOMS, OR THE TENTH PART OF A MILE.**

**THE SOUNDINGS ARE REDUCED TO LOW WATER OF
ORDINARY SPRING TIDES.**

**HEIGHTS ON THE LAND ARE GIVEN ABOVE HIGH WATER
OF ORDINARY SPRING TIDES.**

**WHEN SHADING IS USED TO INDICATE COLOURS OF
FLAGS OR BEACONS, IT IS AS FOLLOWS :—**



Yellow.



Red.



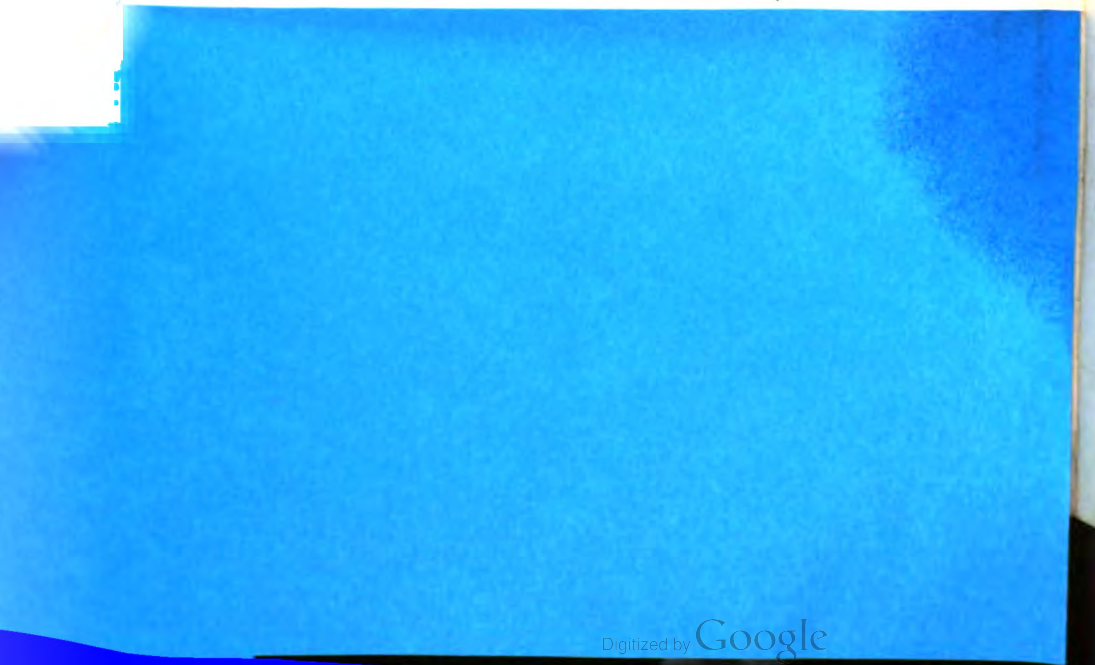
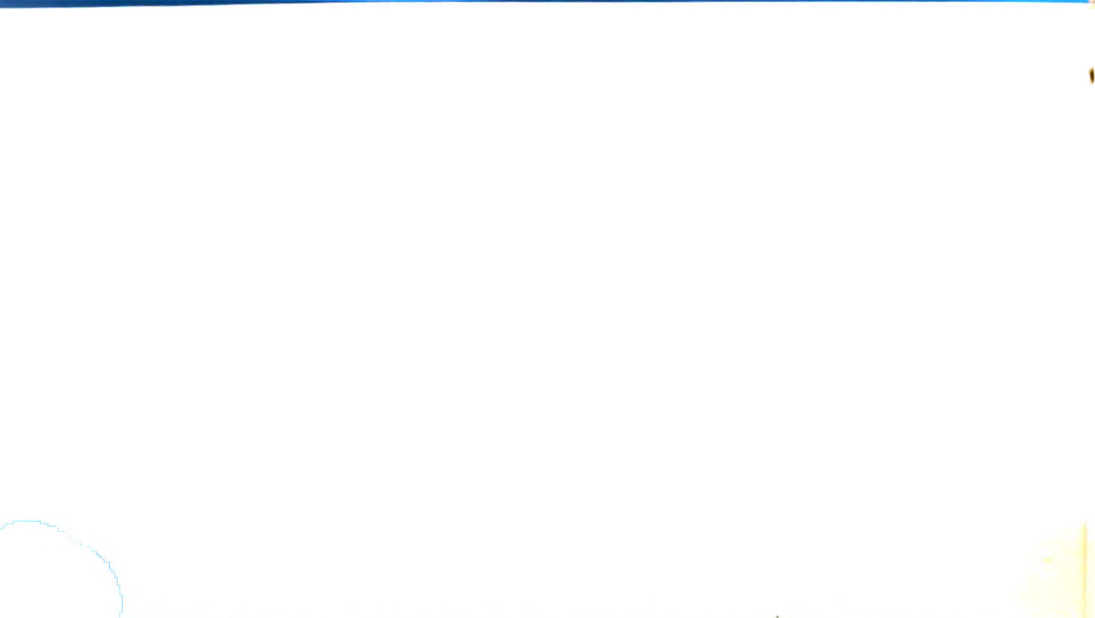
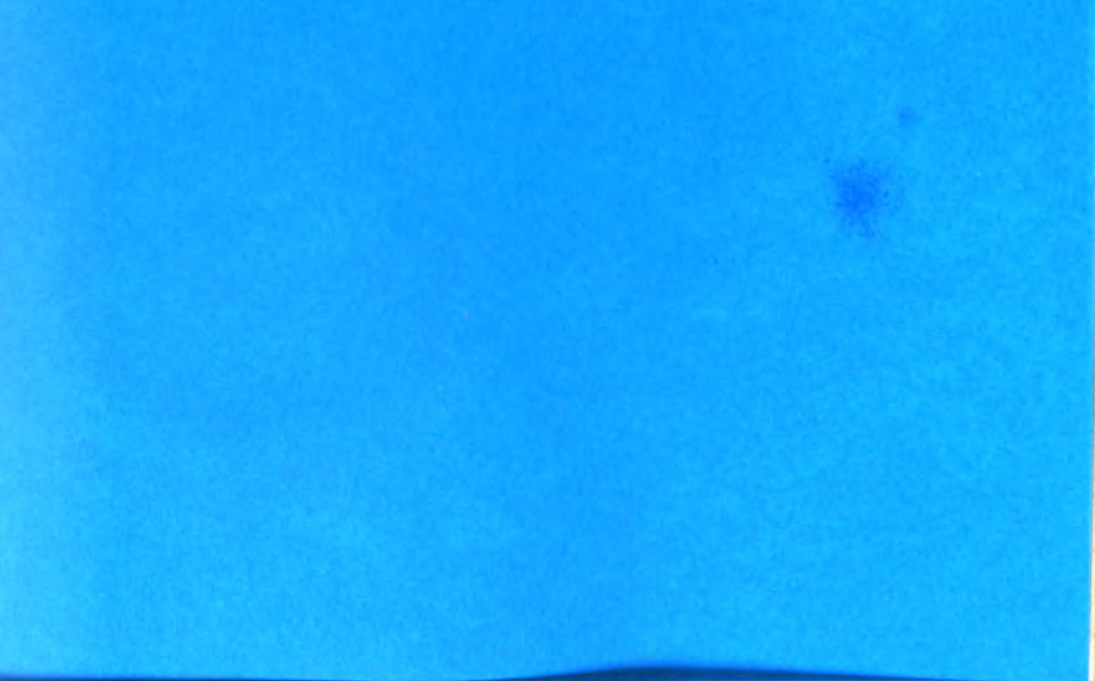
Blue.



Black.



For details of sectors and the latest information respecting the Lights which are included in this work, seamen should consult the Admiralty List of Lights, Part VI. This List is published early in every year, corrected to the preceding 31st December.



EASTERN ARCHIPELAGO PILOT, PART I.

PHILIPPINE ISLANDS, SULU ARCHIPELAGO, AND N.E. COAST OF BORNEO.

CHAPTER I.

GENERAL REMARKS.—WINDS AND WEATHER.—CURRENTS AND
TIDES.—COMMUNICATION.—PASSAGES.

GENERAL REMARKS.—This volume contains a description of the islands of the Eastern archipelago that border the steam route usually followed from the China sea through the Sulu and Celébes seas, towards Australia; and includes a description of the Philippine islands (except the western coasts of Luzon and Paláwan), the Sulu archipelago, and the N.E. coast of Borneo.

Want of surveys.—The greater part of the coasts and waters of the Eastern archipelago have as yet been very imperfectly surveyed. Even in the larger scale charts, founded on more recent examinations, omissions must be expected, as the irregular character of the depths and the prevalence of coral formations forbid any certainty that all dangers have been discovered. A survey of the coasts of the Philippine islands is in progress.

PHILIPPINE ISLANDS.—The northern end of the East Indian archipelago is formed by the Philippine group of islands, the principal of which are Luzon at the north extreme, and Mindanao at the southern end; between these there are several smaller islands, the most important of which are Mindoro, Masbate, Paláwan, Panay, Negros, Sebu, Bohol, Leite, and Samar. The islands are considered by the Philippine Commission to be 1,725 in number.

The existence of the Philippines, a rich and beautiful group of islands, was first made known to Europeans by the Portuguese navi-

gator Fernando de Magalhaens early in the sixteenth century, some 30 years after the discovery of America, and have been in contact with European civilisation for over three centuries.

The modern history of the islands is, therefore, practically contemporaneous with that of America, in comparison with which, however, their progress in public works has been very slight indeed.

Notwithstanding the extent of the group, the actual land area is not large, being only about 115,000 square statute miles. Two-thirds of this area is in the two great islands of Luzon and Mindanao; there are 31 islands, which have each an area greater than 100 square miles, and many smaller islands. The larger islands are long drawn out or deeply cut by gulfs, so that no point in any island is more than 60 miles from the coast.

These islands were formally annexed to Spain in 1565; but were ceded to the United States of America by treaty dated 10th December, 1898.

Most of the islands are clothed with forests of ebony, iron-wood, cedar and sappan wood. They are generally mountainous and have many volcanic cones; that of Albay or Mayon in the southern part of Luzon is 7,943 feet in height, and constantly emits smoke and steam; and Mount Apo, a volcano 9,662 feet high, situated in the island of Mindanao, is probably the highest point in the Archipelago.

Visayan islands.—The islands Panay, Masbate, Negros, Sebu, Bohol, Leite, Samar, and the smaller islands adjacent to these are known as the Visayan islands.

Inhabitants.—The people of the islands consist principally of the aboriginal Abetas or Etas, of dark brown colour, with woolly hair and regular features, living as independent tribes in the interior; and those of Malay origin, known as Tagalas and Bisayas, occupying the maritime districts.

With the exception of the Mohammedan Moros of the southern islands, and the mountain tribes, the Filipinos have been christianised, nominally at least; and in this respect and in their family relations they are perhaps the only Oriental people approaching European ideals. They are naturally a gentle and courteous people, and numbers of them have reached a high degree of culture.

The great mass of the people are of Malay origin; they much resemble the Japanese in complexion and general appearance.

The total population of the Philippine islands in March, 1903, was 7,635,426, of whom 647,740 were classed as belonging to the wild tribes.

Earthquakes of the most severe description have been experienced; the earliest recorded took place in 1616; that of 1796 was sadly calamitous. In 1824 many churches in Manila were destroyed, together with the principal bridge and numbers of houses, and a chasm opened four miles in length. In 1828, 1832, 1852, 1863, 1869, and 1880 there were terrible shocks of earthquake, and in 1891, in the province of Panga Sinan, earthquakes were continually repeated during a period lasting a month. The most recent was the destructive eruption of Albay or Mayon in 1897.

The **capital** of the Philippines and the seat of the Government is Manila, on the west side of Luzon; see China Sea Directory, Vol. II. (Vol. IV. new series).

Products.—The chief products are sugar, hemp, tobacco, and coffee; oil has been found in Luzon, Sebu, and Leite islands; the foreign trade is confined to the ports of Manila, Iloilo (*Lat. 10° 42' N., Long. 122° 36' E.*), Sebu, Samboanga, Sulu, and Balábac (Kalandáng bay).

Coal.—There are coal mines in Batan island on the south-east coast of Luzon, and at Alpako, Danao and Uling in Sebu; coal has also been found in Mindanao, on the south-eastern side of Mindoro, in Negros, Semirara, and in Polillo island.

Climate.—The climate of the Philippines varies little from that of other places in the same latitude. The range of the thermometer during the year is from a little over 60° to about 100° Fahrenheit. The year may be divided into three seasons: the first, cold and dry, commences in November; the second, warm but still dry, commences in March, the greatest heat being experienced from April to the end of May; and the third, which is exceedingly wet, continues from June to the middle of November. This division of seasons does not apply to coasts exposed to the north-east monsoon, where the wet and dry seasons are to some extent reversed. In the southern portions of the Philippine archipelago the wet season is also much less distinct. During the rainy seasons inundations are frequent, and travelling in the interior almost impossible.

The endemic complaints of the country are swamp fever, diarrhœa, beri-beri, and a few others. The islands are also visited by epidemics of cholera, bubonic plague, and smallpox. The mortality is low considering the number of inhabitants.

Typhoons.—The Philippines lie in the track of typhoons, and terrific storms are of frequent occurrence; the local storms that come in the months of May and June, the period of greatest heat, are at times very severe.

A typhoon which occurred on 20th October, 1882, left thousands without shelter, and great loss of life and property resulted. These storms usually originate south-eastwardly from the islands, and move across them into the China sea, some reaching the China coast, others

curving northward toward Japan. The presence of a typhoon brings rainy weather over a large area, but the destructive path is narrow. The centre of the storm moves with an average velocity of about 9 miles an hour, but the most disastrous storm of recent years, that of September, 1905, moved with nearly twice this velocity.

It took this storm a little less than one day to cross the archipelago. The centre passed over the s.s. *Pathfinder*, then on the east coast of Samar. The barometer fell to 27.16 inches, the lowest ever recorded in the islands; it fell one inch in half an hour. *See also* page 12.

Railways.—At the time of the American occupation the only railway in the Philippines was a line running northward from Manila for about 120 miles to Dagupan. Concessions have recently been granted for the building of 723 miles of railway under Government supervision. Of these new roads 428 miles are in Luzon, extending the present line to the north, and giving Manila railway connections to the south-east; there are also some detached lines in the rich hemp country of south-eastern Luzon; 295 miles are in the islands of Panay, Negros, and Sebu, the most important being a line across Panay from south to north. These roads are all to be of 3 feet 6 inches gauge.

In addition to the above, further lines are to be constructed, one of which will connect Lucena with Nueva Caceres.

A branch of the Dagupan railway connects Manila with Kabanatuan, *via* Bigaa. A line connects Manila with Pasig and thence to Marikina and Antipolo. At the end of the year 1909, 442 miles of railway were open in the islands.

Telegraphs.—All the principal islands in the Philippine archipelago are in telegraphic communication with each other and with Manila by means of submarine cables. At Manila connection is made with the universal telegraph system; for places where cables are landed, *see* index.

In June, 1908, there were 2,677 miles of land lines and 1,189 miles of cable in operation in the Philippine islands.

In addition to the telegraph and cable system, numerous telephone systems are maintained, representing 1,895 miles of line.

Wireless stations are installed at Samboanga, Sulu, and at Malabang. Two additional stations are to be installed in the vicinity of Manila, which will give communication with vessels beyond San Bernardino strait.

Communication.—*See* page 21.

Navigation.—In navigating the waters of the Philippines during the rainy season a sharp look-out must be kept for flotsam. Trees of immense size will be frequently met afloat. They have been found especially numerous on the south coast of Luzon; in one case, near Marinduque island, a group of them was adrift, still upright and resembling an island.

Port regulations.—The following are extracts from the port regulations for the ports of Iloilo, Sebu, Sulu, and Samboanga:—

1. All vessels on entering any port of entry or harbour shall show their colours and keep them flying until boarded by the proper officials.

2. All vessels entering a harbour shall be considered in quarantine until boarded by the quarantine officer and given pratique by him. Until pratique is given the prescribed quarantine flag shall be kept flying at the fore.

3. All cases of sickness of a contagious or infectious character which may occur while the vessel is in port must be at once reported to the collector of customs and to the quarantine officer.

4. Every vessel arriving in port, having on board inflammable cargo, such as kerosine oil, powder, or any other explosive, shall hoist a red flag at the fore truck and the flags H Z F of the International code at the main truck, and shall keep such flags flying during the hours of daylight while any such cargo is on board, and shall display by night two red lights vertically at a height of not less than 20 feet above the deck.

5. Should a pilot be required by any vessel, a regularly licensed pilot shall be furnished upon the display of the proper signal or upon application being made at the pilot station. Signal by day, International code letter S; at night, Bengal light, which may be preceded by two whistles.

6. No refuse or other matter which might impede or obstruct navigation or cause an obstruction thereto shall be thrown from any vessel or floating craft of any kind into the waters of any of the above harbours or into the navigable waters of any river tributary thereto.

7. Steam vessels towing shall have the right of way over steam vessels not towing; provided, that steamers of over 10 feet draught shall have the right of way in deep and narrow channels. In carrying out the rules for right of way, due regard shall be had to the fact that a vessel going against the tide or current is much more manageable than one going with it.

Distress signals.—When a vessel is in distress and requires assistance from other vessels or from the shore, the following signals shall be used or displayed by her, together or separately:—

By day:—

- (a) A gun or other explosive signal fired at intervals of about one minute.
- (b) The International code signal of distress indicated by N C.
- (c) The distance signal, consisting of a square flag, having either above or below it a ball, or anything resembling a ball.

(d) A continuous sounding with any fog signal apparatus.

At night:—

(a) A gun or other explosive signal fired at intervals of about one minute.

(b) Flames on the vessel (as from a burning tar-barrel, oil-barrel, &c.).

(c) Rockets or shells throwing stars of any colour or description fired one at a time at short intervals.

(d) A continuous sounding with any fog signal apparatus.

Storm signals.—The following storm warnings are based upon information collected by the Philippine Weather Bureau. Their meaning is the same wherever shown in the Philippine archipelago.

During the day the signals are made by means of a cylinder, cone, and ball, all three black, and a flag of any convenient colour; and at night by *white* and *red* lights, placed either vertically or horizontally; if horizontal, they are read from left to right.

1. A cylinder indicates a distant typhoon; movements uncertain. At night, two *white* lights.

2. A cone, point upwards, above a cylinder, indicates that a typhoon will pass some distance to the northward, and that strong gales between south and west are probable. At night one *white* light and one *red* light.

3. A cylinder above a cone, point downwards, indicates that a typhoon will pass some distance to the southward, and that strong winds between east and south are probable. At night two *red* lights.

4. A ball above a cone, point upwards, indicates a typhoon likely to be dangerous, but danger is not imminent. Look out for next signal. At night three *white* lights.

5. A cone, point upwards, indicates that a typhoon will pass close northward, and that strong gales from north, through west to south, are probable, and may become very violent. At night one *red* light between two *white* lights.

6. A cone, point downwards, indicates that a typhoon will pass close southward, and that strong gales from north, through east to south, are probable, and may become very violent. At night one *white* light and two *red* lights.

7. A ball indicates the typhoon centre will pass over the place. At night one *white* light between two *red* lights.

8. A flag (of any colour) above a ball indicates strong winds, very high tides and floods. No vessels can come in or go out of port nor move about the harbour. At night three *red* lights.

On any one of the above-mentioned signals being made, mariners should take every possible precaution to ensure the safety of their vessels.

Standard time.—The time kept in the Philippine islands is that of the meridian of long. 120° E., or 8 hours fast on mean time at Greenwich.

At Iloilo and Sebu, a signal is received from Manila at the instant of 11h. a.m. standard time.

THE SULU ARCHIPELAGO is a chain of islands, more than 150 in number, with an area of about 1,000 square miles, extending between the south-west extremity of Mindanao and the north-east extremity of Borneo; it is divided into three groups, taking their names from the principal islands in each.

These islands were ceded by Spain to the United States of America 10th December, 1898, but so far had been really in the hands of native Malay or Arab chiefs, the influence of the Spaniards having been confined to the coast ports. The Sultan of Sulu, who formerly claimed dominion over most of the islands, had no power beyond the immediate vicinity of the town of Sulu (*Lat. 6° 3' N., Long. 121° 0' E.*).

The inhabitants, about 120,000 in number, are Mohammedans, of Malay race, speaking a peculiar language, which they write in the Arabic character. They are considerably advanced in civilisation, and are engaged in cultivating rice and rearing horses, cattle, and poultry. The pirates of the archipelago were once a terrible scourge to the eastern seas, and are still a terror to native vessels and to many unprotected coasts.

The principal articles of commerce furnished by the islands are tortoise shell, trepang, and edible birds' nests, besides pearl and pearl shell. A steamer from Manila makes the round of the islands twice a month, and there is occasional steam communication between Sulu and Borneo, and also with Singapore.

BORNEO, the largest island in the East Indian archipelago, is about 690 miles in length north and south, its greatest breadth being 600 miles, and its average width about 350 miles. Chains of mountains traverse its length; the main range, from 5,000 to 6,000 feet in height, terminates in Kini Balu, a mountain 13,700 feet in height, situated about 50 miles from the north extreme of the island. There are several other ranges of mountains.

Its vast interior consists of almost impenetrable virgin forests or jungle, teeming with animal life, but sparsely populated by man. The soil is fertile, and in some parts near the coast is marshy.

The Dutch claim sovereignty over the greater part of the south and west parts of the island, along the coast of which they maintain establishments. The territories of the Rajah of Saráwak, the Sultan of Bruni, and of the British North Borneo Company, extend over and along the north-west, north, and north-eastern coasts. The native states are insignificant and in a backward condition.

The total population is estimated at nearly 2,000,000. The productions are many and varied, and its mineral resources are believed

to be great. The Chinese, who have been settled in most Bornean towns for generations, conduct all the trading operations. The natives are of the Malayan type, and are, as a rule, indolent and wanting in enterprise.

A British Protectorate exists over Saráwak, Bruni, and the British North Borneo Company.

BRITISH NORTH BORNEO.—This state, formerly known as Sabah, situated at the north-eastern end of Borneo, has a coast-line of about 900 miles. The chief geographical feature in the territory is the Kini Balu mountain. The territory of British North Borneo was acquired from the Sultans of Bruni and Sulu by cession for a small annual payment in 1879-80, and the British North Borneo Company was incorporated by Royal Charter in 1881. In May, 1888, a British Protectorate was established.

The area of the state is 31,106 square miles, and includes the whole northern portion of Borneo island to Sibetik island on the east coast, in lat. $4^{\circ} 10' N$.

The population amounts to about 200,000, consisting mainly of Mohammedan settlers on the coast and aboriginal tribes inland, with some Chinese traders and artisans.

Harbours.—The best harbours are those of Gaya on the west coast, Kudat on the north coast, and Sandakan (*Lat.* $5^{\circ} 46' N$., *Long.* $118^{\circ} 10' E$.) on the east coast; the rivers are small.

Produce.—Trade.—The principal products are tobacco, timber, rattans, gutta-percha, india-rubber, seed-pearls, birds' nests, trepang, beeswax, and other natural products. Tobacco-planting promises to become a great industry; coffee is being taken up, and Manila hemp and sugar are receiving attention. The exports in 1909 amounted in value to \$4,575,412, and the imports to \$2,918,307.

Climate.—The climate of North Borneo is noticeable for nothing more than for its equability, and the absence of extremes. The temperature, rainfall, winds, and diseases are, for a tropical country, of the most mild and temperate types, and compare not unfavourably with the Straits Settlements. The chief diseases are fever, beri-beri, and dysentery; fever forms about one-fourth of the cases treated in the hospital.

Rainfall.—The annual rainfall near the coast, according to records kept during the seven years ending 1885, ranged from 101 to 157 inches, with an average of 124 inches.

The true wet season occurs in the north-east monsoon, and includes the months of November, December, and January, and generally part of either October or February or both. During this season the greater part of the rain falls from a uniform dull grey sky, and is pretty

equally distributed between day and night; but the rain is not continuous.

The true dry season immediately follows this true wet season, and includes March and April, and generally part of February and the whole of May. During this time any rain that falls generally occurs in showers at night or early morning, and no month passes without several showers.

This true dry season is followed by a period of moderate rainfall commencing usually about June; the first month or six weeks of which may almost be called a second wet season, and the rest of the period up to the commencement of the true wet season, a second dry season. As, however, the limits of these two are ill-defined, their characters similar, and the difference in rainfall comparatively small, it is better to consider them together as a sort of intermediate season. During this period the rain falls chiefly in heavy squalls (either with thunder or from thundery clouds), occurring most frequently in the afternoon and evening, but not confined to that time; it is during these squalls that the heaviest falls of rain occur. On June 15th, 1884, 2.05 inches fell in 40 minutes.

Temperature.—The temperature recorded at the coast has ranged between the extremes of 67.5° and 94.5° ; but the difference in temperature between the various seasons of the year is very slight. The lowest average temperature (79°) for both day and night is during the wet season in December and January; the highest average temperature during the night occurs during the dry season in April and May (74°); whilst the highest average temperature during the day is in August and September (89°).

The absence of tornadoes, cyclones (*see* page 14), and earthquakes is to be noted. The peculiar phenomena of tropical climates generally are found here; thunderstorms with much sheet lightning are frequent during July, August, and September, and are sometimes severe. Mirage is generally present in the afternoon to a slight extent; phosphorescence occurs in great perfection in Sandakan bay.

On the whole the country appears to be fairly healthy for the tropics, less so than Singapore, but much better than the Dutch islands south of the equator. There is certainly a considerable amount of intermittent fever, and many visitors to the island are attacked; but the disease is not often fatal to Europeans.

Communication.—Trading steamers run constantly between Sandakan, Labuan, and Singapore; and also to Hong Kong, and to Sulu.

Telegraphs.—Sandakan, Kudat, and Darvel bay are connected with Jesselton and Labuan by land telegraph; thence with Europe by submarine cables.

General charts 287, 2576.

Standard time.—Standard time eight hours fast on Greenwich has been adopted in British North Borneo.

WINDS and WEATHER.—General remarks.—The south-west and north-east monsoons of the China sea also prevail to a certain extent over the Philippine islands, the Sulu sea, and the northern part of the Celébes sea, but they blow with diminishing force as lower latitudes are reached, and south of lat. 4° N. the winds are more variable, and often assimilate to those of the Molucca channel. Land and sea breezes occur near the coast. The winds and weather in the China sea are described in the China Sea Directory, Vol. II. (Vols. III. and IV., new series).

South-west coast of Luzon.—The winds on this coast and in the Philippine archipelago are subject to some extent to the winds blowing in the China sea, namely, the north-east monsoon from mid-October to mid-May, and the south-west monsoon from June to October. It may, however, be said that the north-east winds prevail on this coast, and they are generally fresh, especially in November, December, and January, more particularly in the northern part. From February to May they have a tendency to haul eastward in abating. Gales from this quarter frequently set in which last from one to three days; they are nearly always indicated by bright weather with clouds to the north and a rise of the barometer. They also occur in rainy weather but with less force.

The north-east monsoon is regarded as the fine season, and the weather is generally dry and clear except on the coasts directly exposed to it. The wind usually hauls to N.N.E. and North during the day, becoming calm during the evening, and then the land breeze comes off. The high land of the Philippines naturally interrupts the regular course of the wind, and under the land there are sometimes intervals of calm, or westerly breezes blowing from about 10 a.m. until sunset.

The months of March and April are the finest on this coast; during May the winds are weak and variable; storms gather on the mountains and cause violent squalls from S.E. to S.W.

The south-west monsoon is only well characterised from July to October, which is the period of the gales, termed “Collas,” which blow from S.W. to West, and are accompanied by violent squalls and much rain. They often continue for several days. North-west gales and breezes from that direction are not frequent, but when the north-west wind sets in with a little rain and the land appears at intervals, a typhoon must be apprehended. The season of the storms is from September to November; the barometer often remains high, and therefore does not always indicate their approach.

Admiralty Wind and Current Atlas for the Pacific, &c.

Sulu sea.—In the Sulu sea the east or north-east monsoon is not a steady fresh breeze, but is often variable. Near Mindanao the northerly winds never blow fresh, and light changeable winds often displace them for several days. The south-west monsoon commences in May, and becomes regular in June; during this monsoon the weather is gloomy and very wet. About the end of July or middle of August, and sometimes in October, the weather becomes bad, and severe storms (*collas*) occur, which are generally accompanied by thunder and lightning, and are not unlike typhoons. In September the wind decreases, the rain is less, and the sky becomes clear, but in the morning there is a thick fog which lasts till noon. At the change of the monsoon bad weather is felt at times, as in the China sea.

At the commencement of the westerly monsoon the winds are light for some time, with heavy rain, during which the wind blows from an opposite direction, lasting, from the eastward, sometimes for above a week. Occasionally heavy storms happen until the westerly winds become established. During the whole of this monsoon the weather is cloudy, rainy, and at times stormy. *See also* page 62.

North-east Coast of Borneo.—The north-east monsoon commences about the middle of October, and continues till about the middle of April; during the greater part of this time the wind blows steadily and with moderate strength, from the north and east, gradually dying out. In the course of this monsoon, more particularly in December and January, there are generally one, two, or three moderate steady gales, lasting from 3 to 9 days; at other times the wind is a moderate breeze, which, beginning about 11 a.m., gets rather stronger towards evening, and dies away in the early morning, when it may be overcome by a gentle land breeze. At the commencement and end of the monsoon the wind is not so strong or so steady, and the land breeze continues till later in the forenoon.

The south-west monsoon lasts from about the middle of April till the middle of October. The wind as a rule is not so strong in this monsoon; the land breeze in the morning is more marked, and the gales are not so heavy nor so long continued as in the north-east monsoon. On the other hand, there are frequently squalls in the afternoon and evening, lasting for an hour or two, and sometimes blowing with the strength of a fresh gale. Neither in this monsoon nor in the north-east monsoon does the wind rise to the strength of a storm, or even of a whole gale.

The prevailing winds in the afternoon during the south-west monsoon on this part of the coast of Borneo, north of Tanjong Unsang, are generally east to south; southward of Unsang they are usually more westerly, but always light. At night there is generally a land breeze.

Admiralty Wind and Current Atlas for the Pacific, &c.

The first typhoon recorded (as far as known) at Sandakan, was experienced on the 31st October, 1904, and caused great loss of property. Every boat in the harbour was destroyed, numerous small craft were sunk or driven on shore, and extensive damage was caused to the cocoanut plantations. These storms are seldom experienced so far south; one is recorded in December, 1892, as travelling through Balábac strait in a west-north-west direction, its centre passing about 60 miles northward of Sandakan.

Celébes sea.—In the Célebes sea there is but little westing in the wind, the prevailing direction of the monsoons being southerly from the latter part of May to October, and N.N.E. to N.E. from November to April, being at its maximum in February and March. Generally the monsoons are the better marked the more eastward we go. In the south-west monsoon, between Mindanao and Célebes islands, sudden storms from the N.W. take place.

Much rain falls about Basilan and the north end of Célebes island, whilst fine but overcast and sultry weather occurs in the middle of the Célebes sea.

GENERAL REMARKS.—From the foregoing the following general remarks on the winds and weather of the Eastern archipelago have been deduced.

North of the equator.—North-easterly winds prevail from December to March inclusive. This is the fine season, the winds blowing strong and steadily except in the Sulu sea, where variables prevail.

Southerly winds prevail from May to September inclusive. This is the wet season, and the winds are variable in force and direction, with bad weather. Sudden and violent squalls from the north-west occur in the Celebes and Sulu seas.

October and November are unsettled months; the north-east monsoon not being fairly established before the middle of December.

Rainy seasons.—In this archipelago, situated as it is in the vicinity of the equator, and within the regions of calms and doldrums caused by the meeting of the northern and southern wind systems, the wet and dry seasons are not strongly contrasted, as a great amount of rain falls more or less all the year round. The same monsoon is often stormy at sea but fine near the land; as a rule, bad weather with rain is felt on coasts and islands that lie to windward, whilst leeward coasts enjoy fine weather.

REVOLVING STORMS.—These storms, which when they occur in the North-western Pacific, the Philippine archipelago, and northern part of the Chinese sea, between the parallels of 9° N. and 45° N., are named **Typhoons**, are most prevalent in the months of

Admiralty Wind and Current Atlas for the Pacific, &c.

July, August, September, and October ; from December to May they seldom happen, still they have been known to occur in every month of the year. The September equinox is a very precarious period.

It is an invariable characteristic of revolving storms that in the northern hemisphere they revolve round an area of low barometrical pressure in the opposite direction to the hands of a watch, and in the southern hemisphere with the hands of a watch, curving also spirally towards the centre. The knowledge of this law is most important.

The area over which these storms extend varies from 20 to some hundreds of miles in diameter, and near land the strong winds are so irregularly distributed, that in a place near the centre there may be less wind than at some distance further away from it. In the Philippine archipelago the diameter of the exterior revolving circle of the storm is estimated to vary from 40 to 130 miles, and of the vortex or calm region from 11 to 16 miles.

Typhoons are most frequent in the vicinity of Luzon, Hainan, and off the south-west end of Japan. They are said to blow with the greatest fury when near the land, and their violence is not so great when they pass well to the southward of the coast of China.

In the Philippine archipelago the typhoons which appeared, either crossing it or passing through it for a greater or less distance, were 468 in number between the years 1880-1901, inclusive, viz. :—

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
9	2	5	10	25	41	74	74	88	65	51	24	468

This table shows the probability of a typhoon being encountered in these seas in any particular month.

As a rule, typhoons commence from east to south-east of the Philippines, whence they advance in courses between West and N.N.W. In May their paths are confined to the tropics. In June they trend towards Hainan island, over Hong Kong and Swatau, or up the Formosa channel. In July, August, and September they become general.

September is especially dangerous, both for the reasons already mentioned and owing to great irregularity of path caused by the north-east monsoon, which commences in the higher latitudes in fitful puffs. In October they are confined to the tropics by the north-east monsoon ; but a few, having their origin well eastward of the Philippines, will make for the south-east coast of Japan. In November they blow only between the parallels of 9° to 14° north in the China sea ; but, as in October, a few run north-eastward between Liu Kiu and the Bonin islands. In the central and northern parts of the China sea their course lies between N.W. by W. and W. by S. ; those having much

Admiralty Wind and Current Atlas for the Pacific, &c.

northing generally continuing overland and recurving into the gulf of Pechili. The typhoons travelling between W. by N. and W. by S. usually break in-shore. Those that cross the north end of Luzon in the south-west monsoon either come through the Bashi channel and make their way up the China coast, or else run up the east coast of Formosa, and then hug the North China shore; both these paths are dangerous.

Typhoons which cross the Philippines northward of Manila are more frequent from July to October, and never occur from December to May. Those which cross the group southward of Manila are more common in May, October, November, and December.

During the latter months of the year, typhoons that enter the China sea after crossing the Philippines in a low latitude occasionally recurve to the south-westward; others, after crossing the Philippines, recurve in the China sea and re-enter the Pacific, passing between Luzon and Formosa; these latter occur at the beginning and end of the typhoon season, but chiefly in May.

Between July and November, typhoons sometimes form in the Sulu sea and in the area southward of Luzon; they generally travel in a north-westerly direction. A few have been recorded in November and December as forming south-eastward of Mindanao, whence they pass through Balábac strait and over the southern end of Paláwan island. A typhoon visited the north-east coast of Borneo in October, 1904; see page 12.

In the typhoons of the summer months, which move towards the W.N.W. or N.W. in the north part of the China sea, and reach the coast in the neighbourhood of the Gulf of Tong King, the area over which the winds become strong, with a decided fall in the barometer in front of the centre, is generally small. This is accounted for by the low pressure prevailing over the Gulf of Tong King and the continent beyond it. For the same reason the winds in rear are not only stronger but long continued.

In the autumn months (September and October) these conditions are reversed, and in front of the storm the barometer begins to fall, and strong winds blow at great distances from the centre, whilst in rear the area over which the winds are governed by the depression is comparatively small.

In consequence, a vessel in front of a typhoon moving as stated above, will usually get much shorter notice of the advance of a typhoon from the barometer in summer than in autumn, and while in summer the bad weather lasts for a long time in rear, in autumn it improves rapidly when the centre is past and a strong N.E. monsoon sets in.

The winds round a typhoon centre may be said to be composed of cyclonic winds on the one hand and the prevailing wind on the other.

The rate of movement of these storms has been variously estimated at from 5 to 30 miles an hour, the slower movements occurring in the lower latitudes. Mr. W. Doberck, Government Astronomer, Hong Kong, observes: "The average rate of progress of the centre of a typhoon in 11° N. lat. is 5 miles an hour. In 13° it is $6\frac{1}{2}$, in 15° it is 8, in 20° it is 9, in 25° it is 11, in 30° it is 14, and in $32\frac{1}{2}^{\circ}$ N. lat. it is 17 miles an hour."

It should be remembered that these are averages only ; great variations may occur.

Of 85 typhoons which passed northward of Manila, travelling in a mean west-north-westerly direction, the average velocity of the advance of the storm field amounted to 9.8 miles per hour, the minimum rate being 5 and the maximum 27 miles per hour.

Of 68 typhoons which passed southward of Manila, travelling in a mean W. by N. direction, the average velocity was 8.5 miles, the minimum rate being 5 and the maximum 15.8 miles per hour.

These storms are always accompanied by abundant rain, with low dense clouds which at times limit the visible horizon to a few yards' distance, and are generally accompanied by electrical discharge.

The barometer falls slowly for several days before the typhoon, then rapidly on its near approach, and reaches its lowest when the vortex is at a little distance. It then rises rapidly as the vortex passes away and slowly when it has passed to some distance off, and finally regains its normal height ; near the vortex there are usually marked oscillations.

The most dangerous typhoons have been encountered in the Pacific in a low latitude, say 12° N., and long. 130° or 140° E. They are so small there and move so slowly that it ought to be easy to avoid them on board a steamer. They move west-north-westward, and the safest position is to the south-eastward of them. Such typhoons occasionally appear first in the shape of an arch, at first perhaps whitish in appearance, but soon developing into a dark and threatening cloud. Its dark appearance and the extreme slowness of its motion—in fact, it does not appear to move at all — distinguish it from an arched squall, which is moreover often brighter in the centre. If the direction of the motion of the clouds in it is seen to be nearly perpendicular to the bearing of the top of the arch, then there is no doubt that it is a typhoon.

See also page 3.

Warnings of approach.—In the Philippine archipelago the earliest signs of a typhoon are clouds of the cirrus type, looking like fine hair, feathers, or small white tufts of wool, travelling from east or north, a slight rise in the barometer, clear and dry hot weather, and light winds. They may be best seen at sunrise and sunset. They are prolonged in the direction of some point on the horizon towards which

they converge, which is the direction of the vortex of the storm. These warning cirrus clouds may be distinguished from others by the persistence with which they remain on the horizon and by their convergence.

These signs are followed by the usual ugly and threatening appearance of the weather which forebodes most storms, and the increasing number and severity of the gusts with the rising of the wind.

In some cases one of the earliest signs is a long heavy swell and confused sea, which comes from the direction in which the storm is approaching, and travels more rapidly than the storm's centre.

This precursory sign of the cyclonic swell is so valuable and so reliable for vessels on the eastern coasts of the Philippine islands that its importance cannot be exaggerated. From its direction the path of the typhoon north or south of the vessel may be predicted with almost absolute certainty, enabling a vessel to choose an anchorage, if within reach, affording the best protection from wind and sea.

This is only possible when the swell has an uninterrupted advance from the storm centre, as in the case just mentioned. This swell has frequently been noticed from 24 to 72 hours before the outbreak of the storm, giving good warning, especially if from a different direction than the prevailing wind at the time.

The best and surest of all warnings, however, will be found in the barometer. In every case there is great barometric disturbance. Accordingly, if the barometer falls rapidly, or even if the regularity of its diurnal variation be interrupted, danger may be apprehended.

No positive rule can be given as to the amount of depression to be expected, but at the centre of some of the storms the barometer is often two inches lower than outside the storm-field; see page 4.

Practical rules.—When there are indications of a typhoon being near, vessels in the Philippine archipelago should remain in or, if possible, seek refuge in port, carefully observing and recording the changes in barometer and wind, and taking every precaution to avert damage by striking light spars, strengthening moorings, and if a steam vessel, preparing steam to assist the moorings.

The waters of the Philippines are so limited in area and encumbered with islands and shoals that the practical rules for handling a vessel in a typhoon are not applicable within the archipelago. They may, however, be of benefit to a vessel when threatened with a typhoon in the China sea or Pacific, and are, therefore, given below.

In the typhoon season be constantly on the watch for premonitory signs and carefully observe and record the changes in barometer and wind.

When there is reason to believe a storm is approaching the two points necessary for the seaman to know, are (*a*) the direction in which

the centre of the storm is situated ; and (b) in which semicircle of the storm the vessel is situated.

In order to ascertain these two points it is necessary that the observer should be stationary ; the first thing therefore to be done is to stop head to wind, or heave to, and as it is always wise to assume the vessel may be in the dangerous semicircle, she should be hove-to on the starboard tack in the northern hemisphere, and on the port tack in the southern hemisphere. There should be no hesitation in heaving-to, as the sooner a clear knowledge of the position of the ship in the storm is ascertained the better it will be.

To find the bearing of the centre the observer should face the wind, when the centre will be from 12 to 8 points on the right hand in the northern hemisphere, and on the left hand in the southern hemisphere. At the commencement of the storm allow 12 points, when the barometer has fallen three-tenths of an inch about 10 points, and when it has fallen six-tenths of an inch or upwards 8 points.

To ascertain in which semicircle the ship is in, watch carefully the way the wind shifts. If the wind shifts to the right the vessel is in the right-hand semicircle, and if to the left in the left-hand semicircle. This holds good in both hemispheres.

If the ship is in the right-hand semicircle she should if in the northern hemisphere remain hove-to on the starboard tack, but if in the southern hemisphere run with the wind on the port quarter until the barometer begins to rise.

If the ship is in the left-hand semicircle she should if in the northern hemisphere run with the wind on the starboard quarter, but if in the southern hemisphere remain hove-to on the port tack.

If in the direct track of the storm the wind will, without change of direction, increase rapidly in force, whilst the barometer continues to fall, and then the most advisable course to pursue is to run with the wind on the starboard quarter in the northern hemisphere, and on the port quarter in the southern hemisphere until the barometer has ceased to fall.

In all cases act so as to increase as soon as possible the distance from the centre ; bearing in mind that the whole storm-field is advancing.

In receding from the centre of a storm the barometer will rise and the wind and sea subside. See the Barometer Manual for full details.

For table, giving the number of typhoons that occurred at Hong Kong during the years 1886-1899, see China Sea Directory, Vol. II. (Vol. III. new series).

GALES.—With respect to the gales of the Philippines, Captain Villavicencio, who studied the subject during many years, remarks :—“ The gales of the Philippines may be separated into three classes, known by the local names of Colla, Nortada, and Baguio. The *colla* is a gale in which the wind blows constantly from one quarter, but with varying force, and alternations of violent squalls, calms, and heavy

rain, usually lasting at least three days; these gales occur during the south-west monsoon and their direction is from the south-west quarter.

“The *nortada* is distinguished from the *colla* in that the direction of the wind being constant also, the force of it remains steady as well, without the alterations of passing squalls with calms at intervals which characterise the *colla*. The *nortada* is nearly always indicative of a typhoon passing not very far off. These gales occur chiefly in the northern islands, and their direction, as the name implies, is from the northward.

“*Baguio* is the local name for the cyclonic storm known as *typhoon* in the China sea, and has already been described.”

The *colla* is caused by an atmospheric depression to the north or north-east of Luzon; these gales occur more frequently in June or July.

Similar depressions appear in the lower latitudes (4° to 12° N.) during the months of December, January, February, and March, causing brisk north-easterly winds, accompanied by rain in Mindanao and the central islands, sometimes extending to southern Luzon.

CURRENTS AND TIDES.

Japan stream.—The trade-drift, which flows to the westward between the parallels of 9° and 20° N., on reaching the eastern shores of the Philippine islands, recurves to the northward, forming near the northern limit of that group the commencement of the Japan stream.

For further details of this current, see China Sea Directory, Vol. III. (Vol. V. new series).

Equatorial current and counter current.—The westerly equatorial drift in the North Pacific, caused by the North-east trades, extends towards the equator from about lat. 25° N. on the eastern side to lat. 20° N. as the Asiatic islands are neared. In the South Pacific that caused by the South-east trades will generally be found to extend from about lat. 20° or 25° S. to and considerably northward of the equator, its further southern limit being towards the American side of the ocean. Near the equatorial limits of these currents the set is almost due west (true), but between them is the counter equatorial current setting in the opposite direction and sometimes with considerable strength.

Though the limits of the counter current are imperfectly defined, it appears to lie always northward of the equator, generally between the parallels of 4° and 9° N. lat., more commonly between 5° N. and 8° N., though sometimes its influence has been felt almost down to the equator, and it never exceeds five degrees in width. It varies greatly in strength, running from half a knot to 2 knots an hour, and so far as is known with the season also, being stronger from May to October than during the other half of the year, when it sometimes appears to cease.

Admiralty Current charts for the Indian and Pacific Oceans, &c.

China sea currents.—The principal currents in the China sea are the north-east and south-west monsoon drifts. They are both very changeable, their direction and velocity depending much upon local circumstances, but that during the north-east monsoon is the stronger and the more constant. *See China Sea Directory, Vol. II. (Vols. III. and IV. new series).*

Sulu sea.—During the north-east monsoon in the Sulu sea the current runs regularly in the direction of the wind, and varies in strength according to the force of the wind. In the early months of this monsoon, when the wind blows strongest, the current runs with the velocity of a mile an hour, decreasing to about half a mile an hour in May. In June the current reverses with the wind. Between Sulu and Sandakan, in October and November, the current has been found to set south at the rate of from one to $1\frac{1}{2}$ knots an hour.

TIDES.—The observations on tides in the area covered by this book are neither numerous enough nor complete enough to permit of accurate generalisations being made for the whole area. The following remarks, however, based on the existing evidence, afford some idea of the general tidal movement.

They are affected by a diurnal inequality, especially of height, causing a difference between the heights of successive high and low waters, which varies throughout the lunation, and sometimes attains large proportions.

The difference may be almost imperceptible, or may be so great that the movement of the water between the lower high water and higher low water is reduced to a mere stand in the level of the water, giving the effect of only one high and low water during the 24 hours.

The time of high water is generally the most regular feature of the tides and follows the time of the moon's transit as usual.

Spring tides depend upon the opposition and conjunction of the moon and sun (full or new moon), and also on the attainment by the moon of her higher declination north or south.

The effect of these two positions of the moon is about equal on the tide, so that when the moon is either new or full, at the same time that she is in high north or south declination, the spring tide is high and well defined. When the new or full moon occurs when she is on the equator, the spring tide is sometimes almost lost.

The higher water of each day follows either the superior or inferior transit of the moon when she is on one side of the equator, and the opposite transit when she is on the other side of the equator. The particular transit followed by the tide varies in different localities.

Among the Philippine islands, when the sun has north declination, the higher tides about springs occur during the day, and when it has south declination, during the night.

The mean tide level varies during the year; on the coast of Luzon it is lowest in February and highest in September.

Throughout the Eastern archipelago the tides are largely affected by diurnal inequality. At Ubian island in the Sulu sea, near the equinoxes there are two complete tides in each 24 hours, near the solstices only one tide in that time. When the sun has north declination the higher high tide is in the day time, and at night when it has south declination. In the channels between the Sulu islands the tidal streams are strong and irregular, and overrun the times of high and low water by from 2 to 3 hours.

The Philippines.—The following information concerning the tides of the Philippines is extracted from the Spanish Derrotero:—

The tides of Manila, Iloilo, Surigao strait, and Balábac follow the general laws before stated. Two or three days after the moon has crossed the equator, two high and two low tides are observed in the 24 hours, of nearly equal amplitude; during the following days one tide increases in amplitude, and the other decreases until but one occurs in the 24 hours.

Two or three days after the moon has attained its greatest declination, either north or south, the single tide that exists attains its maximum. It then decreases in amplitude with the declination of the moon; soon, a second tide appears, the amplitude of which increases as the other lessens, and the two tides are equal two or three days after the moon has recrossed the equator; then, the first continues to lessen while the second increases until again there is but one tide in the 24 hours.

There can hardly be said to be a regular “establishment,” as it varies daily for each of the two diurnal tides according to the positions of sun and moon; but, in the Appendix, a table is given in which may be found the approximate tide hour for each day of the year at Manila, Iloilo, and Balábac.

The tides on the south coast of Mindanao present the following peculiarities:—the diurnal wave is propagated more slowly than the semi-diurnal, and increases in amplitude on advancing from Davao to Basilan strait, whilst the semi-diurnal wave decreases in amplitude. The diurnal inequality makes itself very apparent in the heights of the flood tides and in the hours of the low tides, and is but little apparent in the height of the low tides and the hours of the flood tide.

As a result of these laws and of the values of the diurnal inequalities there are at Davao and Palak always two tides daily, except at the time of certain equinoctial quarters, when the moon has a maximum declination. At Samboanga there will generally be two tides daily, but one only at every equinoctial quarter. At Isabela the difference is more marked: there are some years (being those in which the moon attains its greatest declination) in which the number of days having but one tide in the 24 hours exceeds the number of days having two

tides. In all cases, however, there are always two equal tides in the 24 hours one or two days after the moon has passed the equator.

In the course of one day the higher high tide, when there are two, and the single high tide when there is only one in the day, is that which immediately follows the hour of the moon's superior or inferior transit according as her declination is south or north.

In the Appendix a table is also given for finding the approximate tide hour for each day of the year at Davao, Palak, Samboanga, and Isabela.

Docks.—There is no docking accommodation at any of the ports included in this work, except small dry docks at Samboanga and Palak in Mindanao; there are patent slips at Sandakan, Iloilo, and Port Sebu; *see* Appendix. For nearest docks, *see* China Sea Directory, Vols. II. and III. (Vols. III., IV., and V. new series), also Eastern Archipelago, Part II.

COAL.*—Supplies of coal may be obtained at Batan island, Iloilo, Sebu, Sandakan, and Sibuko bay in North Borneo. Coal is also kept for various purposes at Samboanga and Caldera bay in Mindanao, Port Isabela in Basilan, Sulu, and Bongao, but at these places the supply to ships is uncertain. For details, *see* the body of the work.

COMMUNICATION.—Philippine islands.—There is a regular line of steamers running direct from Hong Kong to Sebu.

Local traffic among the Philippines is carried on by about 20 steam vessels, having their head-quarters at Manila. One line runs from Manila, through Verde island passage, to ports on the south coast of Luzon, and through San Bernardino strait to Albay and Tabako, twice a month; another calls at the ports in Panay island, Sebu, and Leite, as far as Takloban, twice a week. Besides the above, there is frequent communication between Manila and Iloilo.

A steam vessel runs monthly from Manila to Iloilo, Samboanga, the ports in the Sulu archipelago, and the southern ports of Mindanao to Pujada bay. A small steam vessel calls at Port Kulion in the Kalamianes, Cuyo, and Paláwan, once a month, on her passage to Kagayan-Sulu, Sulu, and Samboanga, and again on her return voyage. There is also a 5-weekly service between Singapore, Sulu, and Samboanga.

North Borneo.—Sandakan is in communication with Labuan and Singapore four times a month, with Hong Kong about four times a month, and with Sulu about three times a month.

TELEGRAPHS.—*See* pages 4 and 9, *also* Index.

DIRECTIONS FOR MAKING PASSAGES.

MANILA to EUROPE.—**Steam vessels.**—For a detailed description of the China sea route and of the Paláwan passage, *see* China Sea Directory, Vol. II. (Vol. IV. new series).

* *See Admiralty Coal and Telegraph chart, 1188.*

Sailing vessels.—North-east monsoon.—*See* China Sea Directory, Vol. II. (Vol. IV. new series).

During the south-west monsoon sailing vessels should make through Mindoro strait (*Lat. 12° 50' N., Long. 120° 35' E.*) or Verde island passage, Basilan strait, or Sibutu passage, and Makassar strait to Sunda strait. If unable to make Makassar strait, they can steer for Molucca passage, and pass east of the Sula islands, and Buru; but in this case it will be better to enter the Indian ocean by Ombai strait.

EUROPE to MANILA.—**Steam vessels.**—*See* China Sea Directory, Vol. II. (Vol. IV. new series).

Sailing vessels, when the north-east monsoon is blowing in the China sea, should enter the Eastern archipelago by Lombok or Ombai strait, and pass into the Celebes sea by Makassar strait; thence through Sibutu passage, or one of the Sulu passages, to Manila.

For passage during the south-west monsoon, *see* China Sea Directory, Vol. II. (Vol. IV. new series).

PHILIPPINES to AMERICA.—Vessels bound to the west coast of North America and Panama would in either monsoon do best to pass up the west coast of Luzon, through the Bashi channel, east of Formosa, into the Japan stream (*Kuro Siwo*), and reach the region of westerly winds in lat. 35° N., without loss of time. The route then follows the arc of a great circle as closely as possible, running up as high as 48° N. from April to November, and keeping between lat. 40° and 45° N. from November to March. Here both winds and currents are favourable.

Sailing vessels bound to Valparaiso or other port of South America are recommended during the south-west monsoon to take the northerly route by the Bashi channel, as indicated above for North America. Maury recommends vessels to follow this route as far as long. 152° E., then to cross the equator in 172° E., and pass either east or west of New Zealand into the westerly winds; Horsburgh and Becher recommend vessels to get into long. 165° to 170° E. before they stand across into the trades.

During the north-east monsoon a shorter route, but with less favourable winds, is to pass down the Sulu sea through Basilan strait (*Lat. 6° 50' N., Long. 122° E.*), then north of New Guinea, keeping between the trades, and north of the equatorial currents in lat. 2° to 4° N. as far as the Gilbert islands, and then to steer S.E. for the westerly winds.

Another route during the north-east monsoon is from Basilan strait through the Molucca channels and Torres straits, with the north-west winds that prevail south of the equator. (*See* "China sea to Torres strait," page 24.) After clearing Torres strait by Bligh entrance,

General charts 1077, 1078, also "Ocean passages."

continue along the southern coast of New Guinea and the Louisiade archipelago until far enough east to cross the trades into the westerly winds.

WEST COAST of AMERICA to the PHILIPPINES.
—**Steamships and sailing vessels.**—From North America all vessels proceeding west will almost of necessity stand to the southward and westward for the north-east trades. In summer and autumn they need not go so far south for steady trades as they do in winter and spring.

Between May and October, on gaining the trades, vessels should make westing on about the parallel of 20° N., as far as the Marianas. Thence full-powered steamships bound for Manila might keep on through the Bashi channel and round the north point of Luzon. Sailing vessels, however, and vessels bound for Iloilo should pass south of the Marianas and steer for San Bernardino strait with the N.E. winds. These will gradually change to variable winds with squalls, and then to the south-west monsoon as the vessel approaches the Philippines. For entering San Bernardino strait *see* Chapter VIII.

Between November and April vessels should make their westing about the parallel of 15° N., and, if bound for Manila, should pass north of the Marianas and enter the China sea by the Bashi channel.

If bound to Iloilo they can enter by San Bernardino strait (*Lat. $12^{\circ} 45'$ N., Long. $124^{\circ} 20'$ E.*).

From South America the passage may be made by using either the north-east or the south-east trades. These two routes are called respectively the northerly and the southerly route. The former is preferred by vessels leaving Valparaiso or Callao from August to February; the southerly is the better route during the remainder of the year.

Northerly route.—After leaving Valparaiso or Callao steer through the south-east trades so that the equator may be crossed in about long. 138° W., and lat. 10° N. in about 143° W.; the north-east trades will be found near this parallel; thence continue as from North America.

Southerly route.—On leaving Valparaiso steer N.W. into the settled trades. These found, the route should be by the Marquesas, south of the Gilbert group, and to the northward of the Pelew islands. After this, shape course according to season as described above.

Auxiliary steamships can shorten the southern route by passing to the southward of the Paumotu archipelago, and after reaching about long. 158° W. they can pass between the Samoa and Tonga islands; but it often happens that calms or westerly winds are met with south of the Paumotu group.

General charts 1077, 1078, also "Ocean passages."

CHINA SEA to the EAST COAST of AUSTRALIA.
 —**Full-powered steamships** should take the Torres strait route in both monsoons. *See below, "China Sea to Torres strait."*

In the N.E. monsoon.—Vessels of low power can also take the Torres strait route, or they can take the passage west and south of Australia; *see China Sea Directory, Vols. I. and II. (Vols. II. and IV. new series).*

Sailing vessels should take the route west and south of Australia as above.

In the S.W. monsoon, vessels of low power may take the Torres straits route if they have coal endurance to steam from Amboina, where they can fill up with coal, to Torres straits; otherwise, they can follow one of the eastern routes for sailing vessels. They can either pass through the Bashi channel into the Pacific, or they may pass through Mindoro and Basilan strait, and then make easting between 4° and 8° N. far enough to fetch the Solomon islands, and thence proceed south to Australia. For particulars of the last part of the voyage, *see "Pacific islands," Vol. I., and "Australia Directory," Vol. II.*

Sailing vessels are recommended by Captain Becher to take one of the eastern routes just described, but in the "Navigation of the Pacific Ocean, China Seas, &c.," U.S. Hydrographic Office, sailing vessels and low-powered steam vessels are advised to follow the route from China to Europe during the south-west monsoon, viz.: by Mindoro and Basilan straits; thence, through Makassar strait and the strait of Sunda; or, Molucca passage, Salayar, and Lombok straits; or through Gillolo passage, Manipa strait, and Ombai passage into the Indian Ocean, and afterwards to pass westward of and then round the south end of Australia.

CHINA SEA to TORRES STRAIT.—The route now generally adopted is:—from Hong Kong to steer across the China sea for Mindoro strait, and to pass about 4 miles west of Cape Kalavite; thence through Apo East Pass between Apo reef and Mindoro island—a safe and good channel. Then proceed through the Sulu sea, between the Cuyos islands and Sultan bank, east of Sombrero rock (*Lat. 10° 43' N., Long. 121° 33' E.*) and 6 miles west of Nogas island off the south-west end of Panay; from this point a southerly course should be steered for the south-west extreme of Mindanao and Basilan strait, leaving the Sultana and Nicholson banks, on which there are depths of 2½ and 3 fathoms, to the westward.

In passing through Basilan strait, either channel north or south of Santa Cruz island may be taken, but the northern is preferred. On leaving the strait, a S.E. by S. course should be steered for Banka passage between Biarú and Banka islands off the north-east point of Célebes. Then proceed southward through the Molucca pass between

General charts 1077, 1078, also "Ocean passages."

the Sula islands and Ombi Major, and through Manipa strait, from whence steer about S.E. by E. $\frac{1}{2}$ E. across the Banda sea for the Arafura sea, passing between the Kei and Aru islands to the north-eastward, and the Tenimber islands to the south-westward. Mano island (*Lat. $5^{\circ} 33'$ S., Long. $130^{\circ} 18'$ E.*), lying near this track, is a volcanic island 880 feet in height, and has no dangers in its vicinity, but the south-west part of the Aru islands must not be approached within 15 miles, as the Blackburne shoals, with only $1\frac{1}{2}$ to 3 fathoms water over them, lie some 9 miles off the coast; the shoalest head of these shoals breaks with a little sea, but the others are not indicated by breaking or rippings at ordinary times.

From the Arafura sea a course should be steered to pass south of Proudfoot shoal at the western entrance of Torres strait, and then through Torres strait as directed in the Australia Directory, Vol. II.

North of Ceram to Torres strait.—In order to escape the south-east monsoon during the months of July and August, when it blows strong and raises a high sea in the Arafura sea, some steamships, after passing Ombi Major, have taken the passage north of Ceram, the Kei, and Aru islands, passing Cape Valsche at a distance of 30 miles, as mudbanks extend to a great distance from the cape. This passage has the advantage of smooth water, but is a little longer and less well known than the passage through the Banda sea.

CHINA SEA to PORT DARWIN.—The same route as above should be followed as far as Manipa strait, whence a course S.S.E. $\frac{1}{4}$ E. should be steered to pass east of Turtle and Damma islands, and between Sermata and Babar islands; and from Sermata to round Cape Fourcroy (*see* Australia Directory, Vol. III.), avoiding the Flinders and other shoals in the Arafura sea.

VERDE ISLAND PASSAGE.—Vessels will find the route east of Lubang island, through Verde island passage, and along the east coast of Mindoro, preferable to that through Mindoro strait. The whole track is clear, but caution must be used in the vicinity of Bakos islets, south-east of Verde island. This is a favourite route during the north-east monsoon for vessels coming from the southward, which get north under the lee of Negros and Panay, and from the north-west point of Panay proceed between Mindoro and Tablas islands to Dumali point, and then on through Verde island passage and up the west coast of Luzon, thus escaping the strong monsoon that is generally felt on clearing Lubang islands.

Westward of Cuyos.—During the south-west monsoon of the China seas, steamers have passed from Basilan strait west of Kagayanes and Cuyos islands, and through Apo west pass into the China sea, and H.M. ships have also used the passage from the China to

General charts 1077, 1078, also "Ocean passages."

the Sulu seas between Kalamianes and Linapakan, and between Linapakan and Paláwan, but these channels have not yet been properly surveyed.

SULU SEA from the westward.—Balábac strait, between the islands of Balábac and Banguey, north of Borneo, is taken by vessels proceeding from Singapore to the southern part of the Sulu sea. *See Chapter III.*

South Banguey channel and Malawallé strait, between Banguey island and Borneo, are sometimes used by vessels navigating to the ports on the north-east coast of Borneo; they are somewhat intricate and demand careful navigation, being for the greater part bounded by dangers. The description of these channels will be found in the chapter on the north-east coast of Borneo. Balábac main channel is recommended in preference to either of these channels, being considered much safer.

Sibutu passage.—Vessels entering the Sulu sea from Makassar strait will find it convenient to use the channel between the Sibutu islands, south of the easternmost point of Borneo, and Tawi Tawi island. This channel is 16 miles wide, quite safe, and easy of navigation both by day and night; but the tidal streams set through the channel with great force.

MANILA to ILOILO.—Vessels can take the Verde island passage to Dumali point (*Lat. 13° 7' N., Long. 121° 34' E.*), and then steer either south along the west coast of Panay, which is considered the best route during the north-east monsoon, or from Dumali point they may steer to pass south of Simara island, and between Tablas and Romblon, then on between Hintotolo and Zapatos islands, and then, turning southward, proceed along the east coast of Panay to Iloilo. This latter route is the one preferred during the south-west monsoon.

MANILA to SEBU.—The same route would be taken as far as Hintotolo island; from there proceed to Malapascua, which lies north-west of Sebu island, and thence south to Sebu. The details of these various routes are given in Chapters V. and VI.

MANILA to SAIGON.—During the north-east monsoon the route is direct for steamships and sailing vessels, making allowance for the current which sets with the wind.

During the south-west monsoon full-powered steamships may take the direct route. Sailing vessels will find the voyage long and trying whichever route they adopt. The Spanish Derrotero recommends the following:—On leaving Manila bay take the Verde island passage, pass down the east side of Mindoro and the west coast of Panay, cross the Sulu sea passing out by Balábac strait, and work

General charts 1077, 1078, also "Ocean passages."

down the north-west coast of Borneo to make westing; then cross the China sea south of the Paláwan shoals.

SAIGON to MANILA.—See China Sea Directory, Vol. II. (Vols. III. and IV. new series).

SINGAPORE to the MOLUCCAS.—Full-powered steamships would probably find it shorter to take the route south of Borneo in both monsoons, but sailing vessels should proceed north or south of Borneo according to the monsoon.

North-east monsoon.—From October to May the north-east monsoon blows north of the equator, and the north-west monsoon south of it; at this season the passage should be through Carimata strait, east of Ontario reef; see China Sea Directory, Vol. I. On leaving the strait a vessel should steer to pass 10 miles south of Great Solombo island, and thence south of Taka Rawataja, on which there is a *fixed and flashing white light*; then south of Mansfield bank, and through Salayar strait between Sarontang (Middle island) and Pamatata (South island). Once clear of Salayar strait (*Lat. 5° 42' S., Long. 120° 28' E.*), Amboina and Banda are easily reached by passing south of Hegadis and Binongka islands; but vessels bound for Pitt passage should round the south point of Buton, and skirt along the shore, avoiding Penguin reef, until they reach the east point, passing to the west of Wangi Wangi islands. They should then bear north for Wowoni island and thence run for the south point of Sula Besi. The currents in this locality set to the south, and are very strong. If drifted to leeward of the north point of Buru, vessels should pass to the southward and eastward of that island, through Manipa strait.

South-west monsoon.—From May to September the south-west monsoon blows north of the equator and the south-east monsoon south of it. At this season a vessel should run south of the Anamba and Great Natuna islands, and then between the Royal Charlotte and Louisa shoals, taking care to avoid the dangerous shoals bordering the Borneo coast, and also the being set to leeward of Balambangan island by the northerly current which prevails in the south-west monsoon. Having made Balambangan island, haul round its north point, and steer through Balábac strait (*see Chap. III.*), then through Sibutu passage or one of the passages of the Sulu archipelago, cross the Célebes sea for the north point of Célebes island, and then work south through Molucca passage.

COMMERCE.—Philippines.—The chief exports of the Philippines are sugar, hemp, tobacco, cigars, and copra. The imports are chiefly cotton goods, rice, manufactures of iron and steel, provisions, cattle, flour, petroleum, coal, &c.

General charts 1077, 1078, also "Ocean passages."

In 1909, the exports amounted in value to £7,275,903, and the imports to £6,475,920, making a total value of the foreign trade of the islands for that year of £13,751,823, an increase of £872,332 over that for 1908. Exports show an increase of £484,013, and imports an increase of £395,478. One dollar United States currency = 2 pesos Philippine currency = 4s. 2d.

Shipping.—In 1909 the aggregate tonnage of vessels engaged in foreign trade that entered was 1,517,485, and cleared 1,481,690. Of the value of exports, 82 per cent., and of imports 63 per cent., was carried in British vessels.

UNIFORM SYSTEM OF BUOYAGE.—Philippine islands.—All buoys that will be hereafter laid down in the Philippine archipelago will be painted in accordance with the system in the United States, and as soon as practicable the colours of the buoys now in place will also be changed, to conform to the system as follows:—

In approaching a channel from seaward, red buoys with even numbers will be found on the starboard side; buoys on the port hand being painted black with odd numbers on them.

Middle ground buoys will be painted with red and black horizontal stripes, and may be passed on either hand.

Mid-channel buoys will be painted with black and white vertical stripes, and must be passed close to in order to avoid danger.

Beacons on the *sides* of channels will be coloured like buoys.

Perches, with balls, cages, &c., will, when placed on buoys, be at turning points, the colour and number indicating on which side they should be passed.

Different channels in the same bay, sound, river, or harbour will be marked as far as practicable by different descriptions of buoys. Principal channels will be marked by nun buoys; secondary channels with can buoys; and minor channels with spar buoys. When there is but one channel, nun buoys properly coloured and numbered are usually placed on the starboard side and can buoys on the port side of it.

Day beacons, stakes, and spindles (except such as are on the sides of channels) are constructed and distinguished with special reference to each locality, and particularly with regard to the background upon which they are projected.

Wreck buoys.—It is the duty of the owner of a wreck to mark it with a buoy or beacon during the day and a lantern at night until it is removed or abandoned.

The Lighthouse Board may place such buoy or light-vessel as they deem necessary to mark wrecks. Such buoys follow the standard system of buoyage in the United States, namely, red buoys to starboard, black to port when entering, and red and black horizontal stripes on obstructions with clear water on both sides. This system indicates on which side the wreck is to be passed.

General charts 1077, 1078, also "Ocean passages."

CHAPTER II.

LUBANG ISLANDS.—WEST COAST OF MINDORO ISLAND.—MINDORO STRAIT. — KALAMIANES ISLANDS. — SULU SEA.—CUYOS AND KAGAYAN ISLANDS.—EAST COAST OF PALÁWAN ISLAND.

VARIATION IN 1911, slightly increasing.

Charts 2454, 2577.

LUZON.—Luzon is the largest island of the Philippines, and, after Java, the most fertile and populous of the whole Malay archipelago. It extends from north to south, with a curve towards the south-east, between the parallels of $18^{\circ} 40'$ and $12^{\circ} 32'$ N., and has a length of about 470 miles, with a width varying from 6 to 120 miles. It has a very irregular outline, and its area is about 40,969 square miles. A range of mountains, known as the Caraballos, runs through the whole of it, branching out in different directions so as to give the whole island a mountainous character. To the north of latitude 16° N. there are two chains, an eastern and a western; the former, known as the Sierra Madre, being the most continuous and lofty. The mountains are generally higher near the eastern side, where they form a bold and almost inaccessible shore, exposed to the full force of the north-eastern monsoon and the waves of the Pacific.

Population.—The population of Luzon at the census of 1903 was 3,798,507.

The north coast of Luzon, from Cape Bojeador (*Lat. $18^{\circ} 30'$ N., Long. $120^{\circ} 26'$ E.*) eastward, is described in Chapter IX. The western coast is not described in this work; the mariner is referred to the China Sea Directory, Vol. II. (Vol. IV. new series).

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

SOUTH-WEST COAST of LUZON.—Although this coast is out of the ordinary track of vessels passing up and down the China sea, yet it is of importance when proceeding to or from Manila, within the Lubang islands. Vessels navigating along it should keep near the shore when the tidal stream is adverse.

From Limbones island, at the entrance to Manila bay, the coast trends southward about 6 miles to Fuego point, and is intersected by

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. various small bays, all of which afford anchorage protected from all winds except those from the westward. It is elevated, rocky, and steep-to, with several islets in its vicinity.

Port Jamelo, situated about $3\frac{1}{2}$ miles southward of Limbones island, at the head of the cove of the same name, which extends about 2 miles eastward, is a quarter of a mile broad in its entrance and about three-quarters of a mile in extent, with depths of 9 to 16 fathoms decreasing gradually towards the shore; at the head of the port the water is shoal. The southern entrance point rises to a height of 360 feet, and has an islet, 120 feet high and a quarter of a mile long, east and west, lying close westward of it.

The best anchorage is on the north side in 6 to 7 fathoms. Mangroves grow near the mouth of the river which discharges at the head of the port, the shore of which is low.

Look cove, about 2 miles farther south, is three-quarters of a mile wide and extends eastward nearly 2 miles, with depths of from 10 to 25 fathoms. The shores are steep-to except near the head, where the depths decrease gradually to a sand beach backed by trees.

Depths.—The depths off this part of Luzon are irregular, varying from 30 to 110 fathoms, and afford but little or no warning when approaching the dangers, close to which are 17 to 60 fathoms; consequently the navigator will have to approach the coast with caution.

The coast.—Fuego point (*Lat. $14^{\circ} 8' N.$, Long. $120^{\circ} 33' E.$*) is moderately high and rocky, with two small islets off its north side. Two other islets, connected by a reef covered by 2 feet of water, lie $1\frac{1}{2}$ miles south-south-east of the point, with a pinnacle rock, awash at low water, on their north-eastern side.

Nasugbu bay lies between Fuego point and San Diego point, $6\frac{1}{2}$ miles south-south-eastward. From Fuego point to Nasugbu point, $4\frac{1}{2}$ miles south-eastward the coast is high and wooded, but from Nasugbu point to San Diego point, 3 miles southward, it is formed by low land with a dark sandy shore, which is steep-to and wooded. At about half a cable westward of Nasugbu point is a pointed rock, 25 feet high. The Wawa river discharges on the south side of Nasugbu point, and about the middle of this bay the River Liang discharges: on the bar of each river is a depth of 2 feet at low water. The town of Nasugbu, containing about 4,250 inhabitants, is situated midway between the mouths of these rivers and about a quarter of a mile inland. It has occasional steam communication with Manila.

Dangers.—A rock awash at low water lies about $2\frac{1}{4}$ cables north-westward of the rock off Nasugbu point.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

A rocky shoal, $2\frac{1}{2}$ cables in length east and west, with less than 2 feet water over its centre part, lies with its western extremity about 5 cables south-west from Nasugbu point.

Anchorage during the north-east monsoon can be obtained southward and eastward of the shoal just mentioned, in a depth of 6 or 7 fathoms, sand, about half a mile from the shore. Small coasting steamers sometimes anchor between Nasugbu point and the shoal.

Talin bay, east of Talin point, situated $9\frac{1}{2}$ miles southward of Fuego point, is $3\frac{1}{2}$ miles wide, but open to the north-west, and foul; its shore is composed of rocky cliffs and sandy beaches. Talin point is 200 feet high, and surrounded by reef to the distance of a cable.

The coast.—From Talin point the coast trends in a southerly direction 10 miles to Kalatagan point, and is very low, with sandy shores and mangroves; it is also intersected by several estuaries, and is fronted by a reef which extends $1\frac{1}{2}$ miles off, outside which the depths under 10 fathoms extend some distance, there being patches of from $3\frac{1}{2}$ to 7 fathoms at a distance of $2\frac{1}{2}$ miles from the shore, which should be given a good berth. From Kalatagan point the coast trends south-easterly 3 miles to Cape Santiago, and is higher; the reef does not extend so far off, and has deep water close outside it.

Cape Santiago.—The south-western extreme of Luzon island is 380 feet high, wooded, and surrounded by a reef which dries out to the distance of about a cable from the shore. The soundings at the edge of the reef are 4 and 5 fathoms, deepening abruptly to 40 and 60 fathoms at the distance of half a mile. *See view a*, at page 308.

LIGHT (*Lat. 13° 46' N., Long. 120° 39' E.*).—From a red brick conical tower with white lantern, 51 feet in height, erected near the south point of Cape Santiago, and attached to the south side of a brick dwelling, is exhibited, at an elevation of 90 feet above high water, a *white group flashing light* with a period of *thirty-six seconds*, visible 16 miles in clear weather.

The light shows groups of *three flashes of four seconds* each, with intervals of *two seconds* between flashes and *twenty seconds* between groups. For arc of visibility, *see Light list and chart*.

Cape Santiago is a semaphore and telegraph station.

Caution.—The channel between the south-west coast of Luzon and the Lubang group, and also that southward of them, is subject at times, between the hours of 4 and 10 a.m., to heavy off-shore squalls, rendering it necessary for vessels under sail to keep good look-out so as to shorten sail in time, or to navigate the channels under reduced canvas.

Fortune island, 390 feet high, situated $6\frac{1}{2}$ miles south-westward of Fuego point, is about three-quarters of a mile long, north-west and

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. south-east, and about $1\frac{1}{2}$ cables broad; it has a white beach at its eastern end, and elsewhere is covered by bushes and trees; it is steep-to.

Simo banks, about 14 or 15 miles northward of the Lubang group, consist of two banks with a least-known depth of 6 fathoms on them. The western and shoaler bank extends 3 miles north-east and south-west, and lies with Fortune island bearing S. 67° E., distant 12 miles. The eastern bank, with 8 fathoms water, lies 3 miles nearer Fuego point. There are irregular depths of 15 to 64 fathoms eastward of these banks, and deep water in other directions.

LUBANG ISLANDS are a detached group of six islands that front the south-west end of Luzon and the north-west end of Mindoro. They are uninhabited with the exception of Lubang island, which has a population of about 3,000. The only safe anchorage for vessels during all seasons is the port of Tilig, situated on the north-east coast of Lubang island.

Cabra island, the north-westernmost island of the Lubang group, is 2 miles in length, north-west and south-east; it is a flat-topped, wooded island about 200 feet in height, with a reef projecting half a cable from its north and north-east sides. There appears to be no off-lying danger.

In the voyage of H.M. surveying vessel *Sulphur* it is observed:—
“Both the *Starling* and *Sulphur* shaved the surf-line of Cabra without obtaining soundings.”

The channel between this island and Lubang is about $1\frac{1}{2}$ miles broad, and may be safely navigated, as the reefs on the north side of Lubang always show. In this channel the flood sets northward and the ebb southward.

LIGHT (*Lat. $13^{\circ} 53'$ N., Long. $120^{\circ} 2'$ E.*).—From a square brick tower, 67 feet in height, with white lantern, erected near the west extreme of Cabra island, and attached to the western angle of a rectangular brick dwelling, is exhibited at an elevation of 217 feet above high water a *white group flashing* light, with a period of *one minute*, thus:—flash, *eight seconds*; eclipse, *seven seconds*; flash, *eight seconds*; eclipse, *thirty-seven seconds*; visible 22 miles in clear weather. For arc of visibility, *see* Light list and chart. The light is visible in mid-channel between Cabra and Lubang islands, but it is reported that there is a small arc in which the light is obscured by trees on Cabra island.

Lubang island, about 16 miles in length, north-west and south-east, is the largest and most important island of the group; it is high

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. in the middle, but low at each extreme and for several miles within its north end.

Its coasts are fronted by a reef to the distance of about a quarter of a mile; the south-west coast is rocky. On the eastern and north-eastern sides are several bays, affording more or less protected anchorage, but difficult to enter owing to the shoals and reefs by which they are enclosed.

Lubang, the principal town, is situated on the northern shore of the island, about 2 miles from the western end. It is in the middle of a fertile plain, and contains a conspicuous church and convent. Landing is difficult in front of the town on account of the coral reef that fringes the shore. There is a break in the reef westward of the church, through which small boats can pass in fine weather at certain stages of the tide. There is no good anchorage in front of the town; the reef is reported to extend farther off than charted, and is steep-to.

Port Tilig, on the north-east side of Lubang, is the only safe anchorage for small vessels in all seasons; it is sheltered from all winds, and has good holding ground in 5 to 11 fathoms. The entrance faces north-north-west, has 9 fathoms in the fairway, and the reefs on either side mark the channel during rough weather. The western shore can be approached until the anchorage, in front of the bastion, is reached, where there are depths of $3\frac{1}{2}$ to 5 fathoms, mud and sand. The head of the bay is occupied by a shoal, dry at low water, dividing the anchorage.

The San Vicente bastion (*Lat. 13° 49' N., Long. 120° 11' E.*), on the west point of the entrance, is a square stone tower, upon the parapet of which stands a wooden house, but it cannot be seen from outside, and is therefore no longer a good landmark.

Ingress and egress, unless in very favourable weather, owing to its being on a lee shore, is questionable for a sailing vessel.

Buoys.—The following buoys have been established to mark the entrance to Port Tilig:—

A red conical buoy, moored in 8 fathoms, coral, 7 cables N. 2° W. from San Vicente bastion, on the reef making out northward from the western entrance point.

A black can buoy, moored in 11 fathoms, coral, $6\frac{1}{2}$ cables N. 17° E. from San Vicente bastion, off the edge of the reef making out from the eastern entrance point.

Supplies.—Cattle, pigs, and poultry can be obtained here at moderate prices, also a fair supply of water. There are no vegetables, and fruit is very scarce.

Tides.—It is high water, full and change, in Port Tilig at 9h. 30m.; springs rise 5 feet. The tides are very complicated.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Afuera bank is $1\frac{1}{2}$ miles in length, east and west, by three-quarters of a mile in breadth, with depths of from $1\frac{1}{4}$ to 4 fathoms over it; on either side of the centre there is a head of $2\frac{3}{4}$ fathoms; from the centre, which is the shoalest part, the bastion of Port Tilig bears about S. 12° E., distant 2 miles.

Clearing mark.—The southern end of Mandani island in line with the northern end of Ambil island, S. 84° E., leads southward of Afuera bank.

Plan of Luk bay on 972.

Luk (Lo-og) **bay** (*Lat. $13^{\circ} 44'$ N., Long. $120^{\circ} 17'$ E.*), on the east side of Lubang, about 7 miles south-eastward of Port Tilig, affords safe anchorage, being somewhat protected from north-east winds by Ambil island.

A reef extends $3\frac{1}{2}$ cables northward of the south point of entrance and 2 cables south-eastward of the north point, and there is a patch which dries about midway between, with a passage 3 cables wide on either side of it.

Good holding ground will be found in depths of from 10 to 20 fathoms at and a little within its entrance points. Under the former depth it suddenly shoals, and several coral reefs encumber the bay and bar direct access to the inner depths, where a short steam vessel might be moored in excellent shelter between these barriers.

In approaching the bay from the south-eastward, the $3\frac{1}{2}$ -fathoms patch, situated about 3 miles eastward of the southern point of the bay, should be given a good berth.

Supplies.—At the village of San Rafael at the head of the bay is a stream of good water, accessible at high tide. Bullocks, poultry, and vegetables can be obtained.

Chart 2577, Between San Bernardino and Mindoro straits.

Ambil island, about $4\frac{1}{2}$ miles in length, east and west, has a conical mountain about 2,500 feet high, with a plain on its western side. The north-east coast is high and rocky, with an open bay, in which are depths of 10 to 12 fathoms; near the shore about the centre of this coast is a rock awash at low water. On the west side is a bay half a mile deep, in which anchorage can be obtained in 4 fathoms, mud; a reef extends 2 cables from the shores of this bay.

The passage between Ambil and Lubang is clear, but caution is necessary on account of the reefs, which contract the channel to one-half its apparent breadth. The flood stream sets southward, and the ebb northward, through this passage.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Ambil bank is crescent-shaped, 2 miles in extent, with general depths of 4 to 5 fathoms; in its centre there are two shoal patches, one of which has $1\frac{1}{2}$ fathoms over it, situated about $1\frac{1}{2}$ miles west of the north extreme of Ambil island (*Lat. 13° 50' N., Long. 120° 17' E.*).

The channel between the edge of the bank and the north-west point of Ambil island is about 4 cables wide, with depths of 11 to 15 fathoms.

Mandani island, three-quarters of a mile off the north-east side of Ambil island, is half a mile long, north and south, and a quarter of a mile wide; it is composed of two hills of unequal height. On the south-west side is a shoal at a cable from the shore, the other sides are steep-to. The passage between the islands is half a mile wide, with from 8 to 12 fathoms of water in it.

Malavatuan island, $3\frac{1}{2}$ miles N. 11° E. of the eastern end of Ambil, is 3 cables in extent, and covered with brushwood. It is steep-to, and has a passage $1\frac{1}{2}$ miles wide between it and Mandani island. Northward, north-westward, and westward of this island are banks on which the least depth appears to be $5\frac{1}{2}$ to 7 fathoms, with deep water around; they lie from 2 to $4\frac{1}{2}$ miles from the island.

Golo island, a high but narrow island, 8 miles in length, west-north-west and east-south-east, with reefs off its north-east, east, and south-east points, adjoins the south-eastern extreme of Lubang. No soundings are shown on its south side, but a reef is known to extend about one cable or more. *H.M.S. Teazer*, 1872, anchored in 13 fathoms, mud, near this side, with Cape Kalavite bearing S. $\frac{3}{4}$ W., and the eastern extreme of the land S.E. by E. $\frac{3}{4}$ E. About a quarter of a cable nearer the shore depths of 4 to 5 fathoms, coral, were obtained.

The channel between this island and Lubang is 4 cables wide, with a rock nearly awash in its centre. The flood stream runs to the north, and the ebb to the south through this channel.

MINDORO ISLAND, WEST COAST.—Mindoro is an island of an oval form with a prolongation of the northern portion towards the west; it is about 95 miles in length and 50 miles wide, with an area of about 3,851 square statute miles, making it the seventh island in size of the Philippine archipelago. Though distant but 80 miles from Manila, this island is, relative to its size, one of the least populous of the archipelago, and is little known and developed, being extremely mountainous, covered with dense forests, and in the more level part near the coast full of marshes and very unhealthy. The inhabitants of the coasts are Tagals, but in the interior there is a low tribe of Malayan race, probably the indigenes of the island, and called Manguianos, speaking a peculiar language and living in a very miserable manner on the products of a rude agriculture.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Mindoro constitutes one of the provinces of the Philippines; the chief town is Kalapan, on the north coast. The population of Mindoro in 1899 was estimated by the Philippine Commissioners to be about 173,000, of whom a large number are wild tribes in the interior.

Some high ranges of mountains extend throughout Mindoro; one of the peaks, Mount Halcon, situated at the north-east part of the island, is 8,504 feet in height.

Very few soundings have been taken off the west coast of Mindoro, but the water is found to be deep close-to in many places; for vessels passing through Mindoro strait there seems to be no necessity for closing the shore.

Cape Kalavite (*Lat. 13° 25' N., Long. 120° 18' E.*) is the north-west extreme of Mindoro. Between it and Paluan bay the water is deep near the shore; for the few rocks interspersed along the coast lie close in, and one of them, near the cape and just above the water, has a sandy beach abreast it. Mount Kalavite, a long-backed promontory within the cape, the summit of which is about 4,990 feet high, appears dome-shaped when seen from the westward, but from the north or south it shows a long ridge, fairly level, but highest at its western end; it is visible from a considerable distance in clear weather.

Plan of Paluan bay on 972.

PALUAN BAY, between Pantokomi and Mirigil points, affords good shelter in the north-east monsoon, and is also a convenient place for vessels to obtain supplies when passing through Mindoro strait. The bay is 5 miles wide at its entrance, and $3\frac{1}{2}$ miles deep in a northerly direction. Off Pantokomi point, western side of entrance, a reef dries for a quarter of a mile, with foul ground about 4 cables outside it. Mirigil point, on the eastern side of the entrance, is surrounded by a reef nearly half a mile wide, which dries at low water, with deep water close-to.

The town of Paluan is situated on the north-eastern shore of the bay on the left bank of the Paluan river, and Lipa, where boat building is carried on, lies on the opposite side of the river entrance.

Black rock lies a short distance off the cliffy head on the south side of the river entrance; there are other rocks near it, and a coral reef projects 3 cables westward from Black rock with depths of 6 and 8 fathoms close to its edge.

Dangers.—A reef with a depth of $4\frac{1}{2}$ fathoms is reported to exist in the southern approach to Paluan bay, $2\frac{1}{2}$ miles S. 7° W. from Mirigil point. It appears to be about half a mile long, north and

General charts 2577, 943, 2661b, 1263.

Plan of Paluan bay on 972.

south, and one-eighth of a mile broad, and may have considerably less water.

A coral reef, about a quarter of a mile in extent and surrounded by deep water, is reported to exist about $1\frac{3}{10}$ miles S. 75° W. from Mirigil point.

Anchorage.—The best anchorage is in the north-eastern part of the bay in 14 fathoms (to which depth the water suddenly shoals from 20 fathoms), with the Black rock bearing S. 87° E., distant $1\frac{1}{2}$ miles. The bottom consists of a black, tenacious mud. More convenient anchorage may be had with Paluan church (*Lat.* $13^{\circ} 24' N.$, *Long.* $120^{\circ} 30' E.$) seen between the black rocks at the river entrance, bearing S. 81° E. in from 7 to 12 fathoms, mud. There is fairly-protected anchorage for a moderate-sized vessel during the south-west monsoon in Pamatusin cove, in the western part of the bay.

Water is obtainable from the river.

Tide.—Spring tides rise 5 feet.

Caution.—Care must be taken when working into Paluan bay, for the squalls come violently off the high land, are very sudden, and at night do not give the least warning.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Tubile point, $6\frac{1}{2}$ miles southward of Mirigil point at the entrance to Paluan bay, is thickly wooded and connected with the main by a low isthmus; it is conspicuous. Reefs project some distance southward, and it should be given a good berth. The shore line between Paluan bay and Tubile point is reported to be about 4 miles longer than is shown on the chart.

The River Mamburao falls into the sea about 3 miles eastward of Tubile point; the village of the same name on the left bank consists of a few nipa houses and the ruins of a church. The roof of the bell tower looks like a white triangle when seen from a distance.

Anchorage can be obtained off the mouth of Mamburao river, in a depth of 5 fathoms, mud and sand, with shelter from north and east winds.

Mamburao reef projects about 3 miles south-westward and southward from Karanisan point, situated 5 miles eastward of Tubile point, and has a depth of one fathom over it at low water.

Vessels bound to or from Mamburao should keep the village bearing N.E. to avoid the foul ground off the points westward of the anchorage and Mamburao reef to the eastward.

The coast, south of Mamburao reef, trends south-south-eastward to Talabasi point, and is low and sandy. From this point, which is

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. surrounded by a reef, the coast continues in the same direction to Sablayan point, which is 25 miles distant from Karanisan point.

Pandan islands.—The two islands of Pandan are situated from one to 2 miles northward of Sablayan point; they are of moderate height and densely wooded. The channel between them appears clear, but the space between the southern one and the shore is full of reefs. Protection may be obtained during the south-west monsoon, by anchoring close eastward of the southern island, in 7 to 14 fathoms, mud. About half a mile eastward of the southern island and on the eastern side of this anchorage in Pandan bay is a small reef with less than 3 feet of water; it lies about half a mile from the mainland. In order to reach this anchorage, pass to the northward of, or between the islands, but as the locality has not been well surveyed it should be approached with caution.

Plan of Sablayan anchorage on 949.

Sablayan point (*Lat. 12° 50' N., Long. 120° 45' E.*) is a small peninsula, extending about half a mile south-westward, and terminating in a wooded mound, 120 feet high. A coral reef, mostly covered at low water, surrounds the point, extending more than a cable offshore. The point appears as a third and smaller island (with the two Pandan islands) when approaching from the northward along the pecked line on chart 2577.

Sablayan anchorage is 8 cables wide between Sablayan point and the coast to the eastward, but the available space is reduced one-half by reefs on both sides, and the northern part is filled by a reef enclosing a lagoon 4 to 5 fathoms deep, to which there is a narrow entrance. Many rocky heads show above water in the northern part of the bay. Anchorage may be obtained at about a quarter of a mile from the church, in 16 fathoms rocky bottom with the point bearing S. 89° W., and the bridge across the river at the head of the bay bearing N. 3° W. The river is not shown on the chart, but is about in the position shown by the break in the shore reef in the northern part of the bay. Vessels are advised not to bring the point to bear southward of S. 89° W., as the bottom is rocky and uneven, and the depth decreases rapidly towards the reefs. If proceeding farther in there is anchorage in 12 fathoms, with the mound on Sablayan point bearing West, at the distance of a quarter of a mile from the beach; and in a depth of 9 fathoms, further in, with the mound bearing W. by S., but caution is necessary as the reefs do not show well. The inner lagoon is only suitable for native craft.

Landing from ship's boats is almost impossible at low water in front of the town, on account of the numerous coral heads; at this

General charts 2577, 943, 2661b, 1263.

Plan of Sablayan anchorage on 949. Var. 1° E.

stage of the tide landing can be made at the river mouth at the head of the bay.

Sablayan town lies on the western side of the anchorage; the church, situated in the southern part of the town at the foot of the wooded mound, is a very substantial and prominent structure. Fowls, fish, coconuts, and water are obtainable in small quantities.

Chart 2577, Between San Bernardino and Mindoro straits.

The coast from Sablayan anchorage trends south-eastward for 35 miles to Mangarin point, and is generally low, with sandy beaches. The low land extends a considerable distance inland, where it is backed by ranges of mountains.

Dongon point is a low, sandy point, situated nearly 7 miles southward of Sablayan point. Anchorage may be found in Dongon bay, eastward of the point of that name, in front of the low, sandy shore, protected from northerly and easterly winds.

Iriron bay, about 9 miles south-eastward of Dongon point, affords good anchorage for small craft during the north-east monsoon; a village is situated on the north side of a small river, but no supplies could be obtained.

The western point of the bay is fringed with rocks, and about one mile north-westward from it, and about a quarter of a mile from the shore, is Iriron rock, and a small bank is shown about a mile farther north-westward.

Lumintau point (*Lat. 12° 31' N., Long. 120° 54' E.*) lies 7 miles south of Iriron bay, and a small shoal is reported at three-quarters of a mile to the north-westward, the existence of which is doubtful. The point is not conspicuous; it and the coast near are low and wooded, backed by low wooded hills with mountains behind. Lumintau river discharges near the point.

The coast from Lumintau point trends south-south-eastward for 7 miles to Bugsanga river, and thence south-eastward for 5 miles to Bubug point at the entrance to Mangarin bay, and is a low steep-to, sandy beach, with a sandy terrace 6 to 12 feet high behind high water mark. The vegetation is scrubby timber, 20 to 60 feet high, and in some places kagon grass extends down to the beach. There is no coral fringing this part of the coast except at Bugsanga point, south of the river of that name, where there is a shore reef half a cable wide. The Bugsanga river has very little water on its bar, and is of no value to navigation. At about 1½ miles northward from Bubug point, and a quarter a mile from the shore, is a very narrow rocky ledge half a mile long, covered by a least depth of 1½ fathoms, with 5 fathoms around; vessels anchoring in its vicinity should not come to in less than 7 fathoms to avoid swinging on it.

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands. Var. 1° 10' E.

Mangarin bay, formed by the coast of Mindoro and Ilin island, is $4\frac{1}{2}$ miles wide between Bubug point and Ilin island, and extends $3\frac{1}{2}$ miles eastward. It is easy of access, and affords good anchorage for all classes of vessels at most seasons. It may be entered from northward or westward or through Ilin strait. Mangarin point is a long, low point extending south-eastward on the north side of the bay; the area between it and the coast of Mindoro is shoal, and of little value to navigation.

A pier extends from the eastern extreme of Mangarin point into a depth of 20 feet; a depth of 23 feet at low water can be carried through a channel 40 yards in width to within 50 yards of the pier, off which there is a turning place about 250 yards across. A better channel for approaching the wharf, carrying a depth of 21 feet, lies eastward of the eastern of the $1\frac{1}{2}$ -fathoms patches mentioned hereafter, but the patch should be marked. A plantation railway extends north-westward from the pier past the village of Pandarochan. There are several godowns at the pier which show up well from seaward. Boats only can reach the village of Mangarin, which lies on the shore about $1\frac{1}{2}$ miles north-eastward from Mangarin point. The village of Pandarochan, the present seat of Government for the municipality of San Jose, situated about $1\frac{3}{4}$ miles north-westward of Mangarin point, contains several low-roofed iron buildings and long wooden barracks for the labourers employed in the neighbouring sugar fields.

Few supplies are to be had, and these are very dear. The water is bad, and the climate unhealthy on account of the marshy surroundings.

Islets and dangers.*—Donjon (*Lat. 12° 19' N., Long. 120° 59' E.*) is a barren sand cay rising about 2 feet above the surface on the northern part of Donjon reef, a coral reef about one mile in length north and south and half a mile wide, lying about $2\frac{3}{4}$ miles south-westward from Bubug point, in the entrance to Mangarin bay. The channel between the reef and Manadi islet, 2 miles eastward from it, and also the channel between it and Ilin island, is deep and clear. Donjon cay is sometimes level with the surface of the sea, and its position varies some 200 yards from season to season.

Clearing marks.*—The western extreme of Ambolon island bearing S. $\frac{1}{2}$ E. leads westward of Donjon reef. The end of Mangarin point bearing East leads northward, and the same point bearing E. by N. $\frac{1}{2}$ N. leads southward, of Donjon reef.

Manadi islet is a very small sandy cay with some bushes on it: it lies W. $\frac{1}{2}$ S. $2\frac{3}{8}$ miles from Mangarin point, and $1\frac{1}{2}$ miles from the shore; it rises on the eastern part of a shoal about half a mile in extent, part of which dries at low water.

Cajui bank, lying about three-quarters of a mile eastward of Manadi, is over a quarter of a mile in diameter. It is awash at high

* Philippine islands Sailing Directions, U.S., 1911.

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands. Var. 1° 10' E.

water, and is surrounded by coral rocks, with depths of 6 to 12 fathoms around; about a quarter of a mile north-eastward from the centre there are small detached patches of $1\frac{1}{2}$ and 2 fathoms, leaving a channel between them and the shore about $2\frac{1}{2}$ cables wide, with $6\frac{1}{2}$ fathoms in the centre.

At a little more than a mile northward of Manadi, and two-thirds of a mile from the shore, is a patch of $3\frac{1}{2}$ fathoms.

Ilin rock, with $2\frac{1}{2}$ fathoms on it, lies about three-quarters of a mile off the northern end of Ilin island, with Mangarin point bearing N.E. $\frac{3}{4}$ E. $2\frac{1}{2}$ miles.

Liscum reef, with one fathom least water, is of small extent, and lies in the northern approach to Ilin strait, on the eastern side of the channel, with Mangarin point bearing N. by E. $\frac{3}{8}$ E., distant about $1\frac{3}{8}$ miles. Vessels should not attempt to pass between Liscum reef and Mindoro, as foul ground exists inside it. The channel between Liscum reef and Ilin island is safe, and three-quarters of a mile wide.

Besides the above-mentioned dangers there are a number of small detached patches, with a least known depth of $1\frac{1}{2}$ fathoms, lying a short distance south and south-west from the end of the pier at Mangarin point, and large vessels should not attempt to go alongside unless these are marked.

Anchorage.—There is anchorage in Mangarin bay in from 2 to 15 fathoms. A good berth is in 6 fathoms, mud and sand, with Mangarin point bearing N. 64° E., distant three-quarters of a mile. Small vessels may approach Mangarin point on the above bearing, and anchor according to draught.

Directions.—Vessels from the north-westward should pass westward and southward of Manadi islet at the distance of three-quarters of a mile, and anchor in the position above given. If entering Mangarin bay by the western channel, the western extreme of Ambolon island should not be brought to bear southward of S. $\frac{1}{2}$ E. until the northern extreme of Ilin island bears E. $\frac{1}{2}$ N., or Mangarin point bears N. 64° E., to avoid Sardine reef off the north-west part of Ilin; when Mangarin point is on the latter bearing it may be steered for and anchorage taken up as directed. Vessels from the southward pass about half a mile westward of Ambolon island, and steer N. 1° W. until Mangarin point bears N. 64° E., when steer for it and anchor as previously directed. Vessels from Ilin strait should steer for Manadi islet as soon as it bears N.W. $\frac{1}{2}$ W.; this will lead westward of Liscum reef, and when Mangarin point bears N. 29° E. haul northward until that point bears N. 64° E., when proceed as directed above.

Tides.—It is high water, full and change, in Mangarin bay, at 10h. 34m.; springs rise $3\frac{3}{4}$ feet.

The greatest range of tide occurs generally in June and December,

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands. Var. 1° 10' E.

and is about 6 feet; the smallest range of tide is about $3\frac{1}{2}$ feet, generally in March and September.

The phases of the moon have but slight influence on the time of high water or on the tidal range.

The highest tides follow the moon's greatest north or south declination; the lowest tides follow the moon's least declination; at the moon's greatest north or south declination there is only one flood and one ebb in the 24 hours; at the moon's least declination there is one flood and one ebb in 12 hours.

The mean tide level varies during the year about 7 inches; it is lowest in February and highest in August.

Coast.—From Bankal point, Mindoro, the coast trends south-eastward for 3 miles forming the north-eastern side of Ilin strait, and then east-south-eastward for 8 miles to Burunkan point, the southern extremity of Mindoro.

Ilin island lies parallel to the south-west part of Mindoro, is 10 miles in length, and from $1\frac{1}{2}$ to 4 miles in breadth. The south extreme is bold-to on all sides, and the northern and eastern shores are fringed by narrow steep-to reefs. Mount Ilin (*Lat. 12° 17' N., Long. 121° 2' E.*), on its north end, is 762 feet in height, and Mount Natangdol, near the southern end, has an elevation of about 790 feet.

From the north-western side, northward of the village of Ilin, a reef extends about one mile from the shore. The remainder of the western side of the island is fringed with reefs not more than half a mile in width.

Sardine reef* is a small coral reef with a least depth of $2\frac{1}{2}$ fathoms on it, and surrounded by deep water, lying $1\frac{1}{2}$ miles westward from Ilin island and $2\frac{1}{2}$ miles northward from Ambolon island. The western extreme of Ambolon, bearing S. $\frac{1}{2}$ E., leads westward, and the northern extreme of Ilin island, bearing E. by N., leads northward of Sardine reef.

Ilin village.—Anchorage.—The village of Ilin lies on the west side of Ilin island and one mile north of the parallel of the northern end of Ambolon. A reef extends half a mile seaward, off which good anchorage will be found in a depth of 10 fathoms about three-quarters of a mile from the shore, with the southern large house of the village bearing N. 89° E., or nearer the reef, west-south-westward of the village, in from 5 to 8 fathoms. The depths appear to be very irregular, and there is a small 4-fathoms patch off the entrance to the boat passage.

Supplies.—A channel, staked by the natives, leads up to the settlement, where a stream discharges into the sea, but much better

* Philippine islands Sailing Directions, U.S., 1911.

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands. Var. 1° 10' E.

water was found trickling over a cliff just round the town point to the southward, to which boats have easier access. Fowls, eggs, and vegetables may be procured.

Ambolon island, westward of Ilin island, is about 3 miles in length, north and south, and 2 miles in breadth; it is hilly, and well wooded, and rises in the northern part to an elevation of 567 feet. The dangers on the seaboard of this island are all visible, and easily avoided. Bognao inlet, on the western side of Ambolon, has a very narrow entrance, inside which is a circular lagoon about half a mile in diameter. The depth in the entrance is 2 fathoms, and there is a small area of deeper water inside; the remainder of the lagoon is blocked by reefs. Kukurrayan inlet is a square inlet on the south-east side of Ambolon; it is about three-quarters of a mile in extent, and its entrance is nearly blocked by Buri islet and its surrounding reefs. Lininob rock, 25 feet high, with a tree on it, lies on the shore reef on the north side of the entrance to Kukurrayan inlet; shoal water extends about $1\frac{1}{2}$ cables southward from the rock. There is a narrow channel eastward and northward from Buri islet leading to a contracted anchorage of irregular shape, with a shoal spot towards its north-western side.

LIGHT (Lat. $12^{\circ} 12' N.$, Long. $120^{\circ} 59' E.$).—A white group occulting light showing groups of two eclipses every thirty seconds, thus:—light, *seventeen seconds*; eclipse, *three seconds*; light, *seven seconds*; eclipse, *three seconds*, is established on the western part of Ambolon island; it is elevated 446 feet above high water, and visible 15 miles in clear weather. The light is exhibited from a white frame structure, 53 feet high. For arc of visibility, see Light list and charts.

Danger.—Baniaga reef, one mile long east and west, and half a mile wide, with irregular depths of from one to 5 fathoms, and several rocks, awash at low water, along the western edge, lies three-quarters of a mile south-south-eastward of the south point of Ambolon island; Baniaga rock, a flat rock about 15 feet high, near its southern edge, sufficiently marks it.

At about $1\frac{1}{10}$ miles N. 57° E. from Baniaga rock, as charted ($1\frac{1}{8}$ miles N. 75° E. in the U.S. directions), is a small rocky patch of $4\frac{1}{2}$ fathoms.

The bay between Ilin island and the south part of Ambolon is about $3\frac{1}{2}$ miles wide east and west, and 2 miles north and south; in the north-east part there are a number of detached patches with from a quarter to $2\frac{1}{2}$ fathoms on them. The bay affords convenient anchorage, but only with northerly winds, and the holding ground is poor.

The channel between Ambolon and Ilin is navigable by vessels under steam or with a fair wind; a patch of $2\frac{1}{2}$ fathoms lies in the southern

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon island. Var. 1° 10' E.

fairway, and there are others of about 4 fathoms, for which *see* the chart.

Ilin strait.—The strait between Ilin and Mindoro is straight, deep, and free from danger, but owing to the prevalence of light airs should not be attempted by a sailing vessel without a fair wind. Kagurai point, on the eastern side, is low and wooded, and has shoal water about $1\frac{1}{2}$ cables off it, which extends round the point into Lalaugan bay, which is $1\frac{1}{2}$ miles wide between Kagurai and Lalaugan points, half a mile deep, and is shoal throughout. Water may be obtained in Lalaugan bay. Kagurai river discharges on the north side of the point of that name, and is navigable by pulling boats as far as Kagurai village. The village of Santa Teresa lies on the beach half a mile southward of Lalaugan point; shoal water extends about $3\frac{3}{4}$ cables off-shore in front of the village.

Kominahuet point, the eastern entrance point of the southern end of Ilin strait, is a low rocky bluff fronted by shoal water to a considerable distance, the 3-fathoms contour being about $6\frac{1}{4}$ cables south-westward from it; this must be borne in mind when entering or leaving the southern end of the strait. Santa Teresa hill is a prominent round-topped hill, about 400 feet high, situated one mile northward from Kominahuet point.

Directions.—When entering Ilin strait from the northward, Manadi islet should be kept astern, bearing N.W. $\frac{1}{2}$ W., to give Liscum reef a good berth. In passing through the strait the Ilin island side should be favoured, as the water shoals suddenly on the Mindoro side. After clearing the strait it should be kept open astern until Burunkan, the eastern point of Pandarochan bay, is in line with the south end of Garza island; then steer S.E. by E. until Garza island bears North, which will lead south-westward of the reef extending from Garza.

Vessels entering the strait from the southward and eastward should pass about $2\frac{1}{2}$ miles southward of Garza island, and steer westward until the strait is well open, when haul up for it and follow the previous directions.

Anchorage.—Good protected anchorage may be had in Ilin strait, north of Kagurai point, in from 14 to 16 fathoms, mud, about 250 yards from the beach on the Mindoro side. From this anchorage Manadi islet will be seen open of the north-east point of Ilin island, and the south-east point of Ilin island open of Kagurai point. This position is abreast a remarkable high feathery-topped tree, about half a mile northward of the mouth of the Kagurai river.

Pandarochan bay, between the southern part of Ilin island and Burunkan point, is about 7 miles wide, and extends northward

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands. Var. 1° 10' E.

some 5 miles. The northern shore is low and sandy, with mangroves and scrub timber behind it. Four or five small rivers, the bars of which are nearly dry at low water, discharge into the northern part of the bay. It is safe throughout, affording good anchorage and shelter from northerly winds at the mouth of Ilin strait, in a depth of 10 to 12 fathoms. Garza island and its extensive shoal also offer shelter from strong easterly winds; there is anchorage in 18 fathoms $1\frac{1}{4}$ miles north-westward of the north end of Garza.

Burunkan point (*Lat. 12° 12' N., Long. 121° 14' E.*), the southern extremity of Mindoro island, is free from danger, and may be passed close-to. It is composed of low limestone cliffs, much underworn by the sea. The land behind the point rises rapidly, reaching a height of 253 feet at the distance of one-third of a mile.

Garza island,* $2\frac{1}{2}$ miles westward of Burunkan point, is a low and sandy islet covered with trees and encircled by a reef which dries at low water. A shoal somewhat wider than the island extends about 2 miles southward, covered by irregular depths of from 5 to 9 fathoms, with a least depth of $3\frac{1}{2}$ fathoms, and shoal water extends a quarter of a mile northward. It is difficult to distinguish at night.

The passage between Garza island and Mindoro is clear, and half a mile wide between the 5-fathoms lines.

Chart 2577, Between San Bernardino and Mindoro straits.

MINDORO STRAIT.—This wide strait, separating the Kalamianes from Mindoro island, is one of the most frequented channels for sailing vessels which leave Manila for India towards the end of April, and throughout the south-west monsoon period; and by other vessels at all times of the year from the ports of China to Australia.

It is divided into two passes by Apo island and reef.

Apo island.—Apo island is about half a mile in extent, covered with trees, and visible from a distance of about 10 miles. White beaches front its south and east sides, and the reef surrounding the island extends about half a mile in places. It is separated from Apo reef by a narrow channel with a depth of 90 fathoms, no bottom. The island is about 22 miles westward of Dongon point, the nearest part of the coast of Mindoro, and nearly the same distance from Nanga and Tara islands, the nearest of the islands outlying Busuanga on the western side of the channel. There is no good anchorage off Apo.

LIGHT (*Lat. 12° 40' N., Long. 120° 24' E.*).—An alternating flashing light, every five seconds, thus:—white flash; eclipse, five seconds; red flash; eclipse, five seconds, is shown at an elevation of 134 feet above high water from Apo island, and is visible 17 miles in clear weather. The lighthouse is a black, steel tower with a white lantern, 118 feet high; concrete dwelling near tower.

Apo reef is about 10 miles in length in a north-north-west and

* Philippine islands Sailing Directions, U.S., 1911.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E. opposite direction by about 6 miles in breadth. Near its western edge is Menor islet, a wooded islet similar to Apo but smaller; it has a conspicuous tree in the centre, and lies about $1\frac{1}{2}$ miles eastward of Apo island. Towards the eastern edge of the reef are other rocks above water, visible some miles off. At low water many small rocks are dry on the reef, particularly along its north side; the whole of the reef is steep-to.

Apo East pass is $14\frac{1}{2}$ miles wide between Apo reef and the nearest part of the coast of Mindoro; discoloured water with tide-rips has been observed in places some 7 miles off the coast between Dongon point and the Ambolon group, but soundings in one gave no bottom at 100 fathoms; there are no known dangers in it.

Discovery bank, in the fairway of Apo East pass, is $1\frac{1}{2}$ miles long, north and south, and very narrow; the least water on it is 9 fathoms. The sea does not break on the bank, nor is it marked by any discoloration of the water. From the centre of the bank, the northernmost of the two Pandan islands off Mindoro bears N. 25° E.; Mount Kalavite, N. 18° W.; and Apo islet, S. 83° W.

Sarraceno bank is about $1\frac{1}{2}$ miles in extent, and has a least depth of 14 fathoms, with Mount Ilin bearing N. 65° E., distant $15\frac{1}{2}$ miles. The shallow part is of red coral, but as the depth increases the character of the bottom alters, and at 50 fathoms it consists of coarse sand and gravel. At about $1\frac{1}{2}$ miles west-south-westward there is a patch of 16 fathoms.

Leonidas shoal, about $3\frac{1}{2}$ miles in length north and south, and $2\frac{1}{2}$ miles wide, is composed of coarse sand with shells and coral. From the position of least depth, 8 fathoms, the northern end of Ambolon appears well within the northern end of Ilin bearing N. 34° E., the former distant 12 miles, and the south point of Ilin N. 69° E.

Chart 971, Semirara, Ilin, and Ambolon islands.

Dominga shoal, about $7\frac{1}{2}$ miles S. 20° E. of the southern point of Ilin island, is about $1\frac{1}{4}$ miles in length within the 10-fathoms line, north-north-west and south-south-east, and three-quarters of a mile broad, with a least depth of $3\frac{1}{2}$ fathoms near the centre.

Chart 2577, Between San Bernardino and Mindoro straits.

Panagatan reef (Lat. 11° 51' N., Long. 121° 17' E.), at the south-eastern entrance to Mindoro strait, and $4\frac{1}{2}$ to $7\frac{1}{2}$ miles westward of Sibay island (*see* page 313), is about 4 miles in length north-west and south-east, and 2 miles in breadth. There is an islet upon it covered with low bushes, which appears to be increasing in size, and was in 1892 about 3 miles long. The reef is apparently steep-to, but temporary anchorage may possibly be found on a bank extending from its south-east end.

Directions.—Vessels navigating Apo Eastern pass should follow, *General charts 2577, 943, 2661b, 1263.*

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ} 10' E.$ both day and night, the pecked line marked on the chart, which line leads about $3\frac{1}{2}$ miles off the land near Cape Kalavite, about $5\frac{1}{2}$ miles westward of the Pandan islands, 4 miles westward of Dongon point and $1\frac{1}{2}$ miles westward of Ambolon island. Apo reef should be avoided, as the lead will give no warning of approach to it, and the reef does not always break, but bearings of Apo island and the Pandan islands, and other objects, will enable the position of a vessel to be accurately fixed during daylight. For lights on Ambolon and Apo islands, see pages 43, 45.

Apo West pass, or Northumberland strait, is 19 miles wide between Apo island and the islands outlying Busuanga, and is deep throughout the fairway.

Hunter and Merope rocks lie in the northern entrance.

Also chart 967, Paláwan island.

Hunter rock (*Lat. $12^{\circ} 40' N.$, Long. $120^{\circ} 11' E.$*), on which the sea breaks, consists of a rocky ledge 2 cables in extent with a patch of $1\frac{1}{2}$ fathoms on its south extreme, and has depth of 18 to 40 fathoms around. From the rock Mount Kalavite bears N. $13^{\circ} E.$, and Apo island S. $89^{\circ} E.$, distant about $12\frac{1}{2}$ miles.

Merope rock, on which the sea breaks, lies $5\frac{1}{2}$ miles north-east of Hunter rock, and consists of a ridge $1\frac{1}{2}$ miles in extent north and south, and half a mile wide; the least depth is $2\frac{1}{2}$ fathoms, and there is no bottom with 90 fathoms within a quarter of a mile. From the rock Mount Kalavite bears N. $9^{\circ} E.$, and Apo island S. $66^{\circ} E.$

Weather.—Land and sea breezes were experienced here in March, the latter from west and south-west, with the tidal stream or current setting northward; land and sea breezes prevailed also to the westward of the Kalamianes. The set of the current depends chiefly on the prevailing wind; a current setting south-eastward at the rate of 0.6 miles an hour has been observed.

The KALAMIANES.—**General remarks.**—The Kalamianes are a group of high islands lying between the north-east end of Paláwan and Mindoro, and extending between the parallels of $11^{\circ} 39'$ and $12^{\circ} 20' N.$, and the meridians of $119^{\circ} 47'$ and $120^{\circ} 23' E.$

These islands form, with the northern part of Paláwan and the Cuyos islands, a province, the capital of which is Taitai in Paláwan island. All these islands are, generally speaking, hilly and broken. The industry of the locality is in collecting edible birds' nests, honey, and wax; but cultivation is not practised to any great extent. The forests produce good timber for building or cabinet work.

Climate.—The climate of these islands is in general hot and unhealthy; intermittent fevers and cutaneous diseases prevail, attri-

General charts 943, 2661b, 1263.

Charts 2577 and 967. Var. 1° 10' E.

butable in all probability to excessive moisture and the bad quality of the drinking water.

Busuanga, the largest island of the group, is about 33 miles in length north-west and south-east, and 18 miles in breadth. It is irregular in form, with numerous deep bays. The islands and reefs which front its north-east side form the western side of Apo West pass or Northumberland strait, the western channel of Mindoro strait.

North coast.—From the northern point of Busuanga the coast trends south-eastward for about 21 miles, and then northward for 5 miles to Kokonongon point, forming a large bay. On the first mentioned stretch of coast are two villages; Kabilauan island lies at the head of this bay, and it is reported that good anchorage sheltered from all winds may be found between it and the shore. A small islet, 20 feet high, lies three-quarters of a mile westward of Kokonongon point.

Off-lying islands and dangers.—**Kolokoto**, or **North rock**, is the north-western and highest of four large black rocks, which appear as one when seen bearing S.E. by E. or in an opposite direction; it was estimated to be 100 feet high. Kolokoto is the northernmost of the islands which lie on the north side of Busuanga, and may be seen from a distance of 13 to 14 miles.

The depths northward and eastward of the Kalamianes are very irregular, 17 to 30 fathoms, with patches of 5 and 8 fathoms, and it is necessary to be on the look-out for shallow water when navigating in this locality.

A patch of 5 fathoms is shown on the charts $11\frac{1}{2}$ miles N. 55° W. of Kolokoto rock. H.M.S. *Flying Fish* anchored on this bank, which is of small extent, and sounded over it in boats, but found nothing less than 10 fathoms, with 25 to 30 fathoms around.

Dimipak, or **High island** (*Lat. $12^\circ 22' N.$, Long. $119^\circ 53' E.$*), lies about 2 miles northward of the north point of Busuanga. It is not quite 2 miles in extent, and the channel between it and Busuanga does not appear to be free of danger, as some rocks were seen above water eastward of the island.

North-west, or Dichilem rock.—About three-quarters of a mile north-westward of Dimipak island are rocks above water, one of which, Sail rock, 140 feet high, is remarkable; and $1\frac{1}{4}$ miles north-westward of this lies a black rock, named North-west rock or Dichilem, with a depth of 37 fathoms between. About 2 miles north-north-east of Dichilem is a coral patch of 8 fathoms.

Tanobon island, standing on a reef about 2 miles in length north-east and south-west and one mile in breadth, lies about $2\frac{1}{2}$ miles

General charts 943, 2660b, 2661b, 1263.

Charts 2577 and 967. Var. 1° 10' E.

south-eastward of Dimipak island. About midway between Tanobon and Dimipak there is a submerged rock.

Diboyoyan is a small islet lying west-north-westward 7 miles from Kokonongon point and $3\frac{1}{2}$ miles from the nearest shore, and 2 miles southward of it is Dimakiat islet.

Dumunpalit (Turret) island, situated 7 miles south-eastward of North rock, is 816 feet high, with several detached rocks about it, and a hummock on its south-west point, somewhat like a turret.

Nanga islets, 15 miles S. 63° E. of North rock, are two small wooded islets with sandy beaches, the largest being 344 feet high. About three-quarters of a mile north-north-east of the north-western islet is a black rock above water on the reef which surrounds them.

Kamanga islets, south of Nanga, are about 400 feet high, four in number, and cliffy; the chart shows them to be surrounded by a reef.

Tara island (*Lat. $12^{\circ} 18' N.$, Long. $120^{\circ} 21' E.$*), situated 9 miles east-north-eastward of Kokonongon point, is about $3\frac{1}{2}$ miles long north and south, and one mile broad. When seen from the northward it shows a triple peak at its north-west end; while its southern part looks like a separate island, saddle-shaped. From the eastward the island appears of uniform height. The southern peak is 730 feet high, and the northern one 560 feet. On the south-west side there is good anchorage in a depth of 10 fathoms in a gap in the reefs which extend westward from the island, at some places to a distance of half a mile. From the anchorage, Kamanga islets bear W. $\frac{3}{4}$ N.; and the western point of Lagat islet S. $\frac{3}{4}$ W.

Reefs.—A patch of 3 fathoms lies West $1\frac{1}{2}$ miles from the south end of Tara; the depths about the northern end are irregular; a patch of 6 fathoms lies between Tara and Nanga; and a patch of 9 fathoms lies N. 11° W. 8 miles from the northern end of Tara.

Lagat is an island, 334 feet high, surrounded by a reef with a narrow passage between it and the reef off the south end of Tara.

Bantak island, south-south-eastward from Tara island, from which it is separated by a channel $1\frac{1}{2}$ miles wide, is 800 feet high and fairly well cultivated; high rocks lie off its north and south extremes, and sunken rocks off its north end and western side. The vicinity has not been sounded.

Kalanhayaun island, flat topped, and 500 feet high, is connected with Bantak by a reef.

Lubutglubut island, 660 feet high, appears inaccessible; north of it a reef extends to the distance of one mile, with rocks above

General charts 943, 2661b, 1263.

Charts 2577 and 967. Var. 1° 10' E.

water. A group of rocks, 380 feet high, lies $1\frac{1}{2}$ miles south of Lubutglubut.

The east coast of Busuanga is formed by a range of hills having an average height of 1,200 feet. The most conspicuous among them, seen from the northward, is a three-headed peak 1,880 feet high. Mount Tundalara, southward of it, 2,152 feet in height, has a smooth summit with a small knob on it, not visible from the northward. Over Kokonongon point there is a conspicuous cone 1,300 feet high.

Minanga bay, south-eastward of Kokonongon point, is blocked by islands and shoals. From Alonon point, southward of the bay, a bank of coral extends 3 miles off, with depths of 5 to 10 fathoms, shoaling towards the coast.

Port Borak (*Lat. 12° 2' N., Long. 120° 18' E.*), $1\frac{3}{4}$ miles southward of Alonon point, is reported to be very narrow, but sheltered by the islands Dinaran and Mataya, and to afford anchorage in $2\frac{1}{2}$ to 9 fathoms.

Dinaran island is saddle-shaped, with two peaks about the same height, 550 feet; it is surrounded by a reef. A shoal lies $1\frac{1}{2}$ miles south-eastward, with Mataya island in the middle of it; this shoal is nearly 3 miles in extent north and south. There is a depth of $5\frac{1}{2}$ fathoms $2\frac{1}{2}$ miles from Mataya island, southward of the reef.

Dibatuk island, lying about $1\frac{1}{2}$ miles off the south-eastern end of Busuanga island, is about 300 feet high. H.M.S. *Flying Fish* anchored in the bay north of Dibatuk in 17 fathoms, with the summit of Dibatuk bearing S.S.W. $\frac{1}{4}$ W., and a rock off the east point of Busuanga E. $\frac{1}{2}$ S. On entering this bay the vessel passed over a ledge of 4 fathoms, extending half a mile from east point, so narrow that the cutter sounding ahead of the ship missed it.

Koron island is rocky, precipitous, and about 1,200 feet high. Its south end terminates in a sharp point, named Kalis, and is steep-to. It is sparsely wooded, and its caves afford a large number of edible birds' nests.

Shoals.—About the middle of the eastern coast there is a shoal of sand and coral, covered by $5\frac{1}{2}$ fathoms, close eastward of which a bank, depth unknown, is charted: and another shoal, of $3\frac{1}{2}$ fathoms, lies midway between Koron and Dibatuk. It is reported that there is much shoaler water between Dibatuk and Delian islands than is shown on the charts.

Koron passage, between Koron island and Busuanga, is used by the steamers trading between Port Kulion and Manila. It is sinuous and narrow, having a greatest width of a third of a mile, with depths of 15 to 25 fathoms. The chart shows patches of $2\frac{1}{2}$ and $4\frac{1}{2}$ fathoms in the fairway.

General charts 943, 2661b, 1263.

Charts 2577, 967. Var. 1° 10' E.

Directions for Koron passage.—Coming from the eastward, vessels should keep on the Koron shore, which is steep-to, and when the north point of Koron is rounded the islet Makinit should be kept aboard. Then the north-west coast of Koron island should be followed, giving a berth to the islet $1\frac{1}{2}$ miles eastward of Balolo point, from which a reef extends westward $1\frac{1}{2}$ cables, as well as to the reef which extends nearly 2 cables off from Balolo point, and also avoiding the reef that projects south-eastward 4 cables from the south-east point of Uson island.

Delian island (*Lat. 11° 51' N., Long. 120° 18' E.*), situated $3\frac{1}{2}$ miles north-east of Kalis point, is 450 feet high. The shores are steep-to, with the exception of some rocks off its southern end, and a short reef on its north-east side. On the west side there is a white sand beach, with a short spit. There is a small islet off its southern end.

West coast of Busuanga.—Off-lying dangers and islands.—**Lena shoal**, with an estimated depth of from 5 to 6 fathoms, was observed in 1902 by the Norwegian s.s. *Lena*, in a position S. 82° W., $9\frac{1}{2}$ miles from North-west rock.

Pinnacle rock, about 2 miles west of the north point of Busuanga, is a sharp rock above water, having a depth of 25 fathoms at about 2 miles, and 12 fathoms at one mile westward of it.

Elet, a $2\frac{1}{2}$ -fathoms patch, lies close westward of two islets, joined by a reef to a point of the north-west part of Busuanga, and distant about 5 miles southward from Pinnacle rock.

Haycock or Malahon island is a rocky island 753 feet in height, situated about 2 miles off the western part of Busuanga; it appears like a haycock when seen from the north or south, but from east or west it shows a flat top. The island is apparently formed of limestone, much underworn at the water's edge, and very steep, and is a good place for collecting edible birds' nests.

A shoal, about one-third of a mile in extent, with depths of from $4\frac{1}{2}$ to 8 fathoms over it, lies N. 55° W., distant 7 miles from Malahon or Haycock island.

Discoloured water has been seen to the westward of this position, but was not examined.

Nalaut, or Green island (*Lat. 12° 3' N., Long. 119° 47' E.*), the westernmost island hereabout, is 242 feet high, covered with trees, and visible 15 miles off; it is surrounded by a coral reef, extending about one-third of a mile. About 2 miles north-west of the island is a coral shoal, having 5 fathoms and probably less water, with 9 fathoms

General charts 943, 2660b, 2661b, 1263.

Charts 2577, 967. Var. 1° 10' E.

close-to. East Nalaut island, 144 feet high, lies 3 miles east-north-eastward of Green island, with a depth of 23 fathoms between.

Patches of 8 to 9 fathoms, with 20 to 30 fathoms between, exist to the distance of 6 miles westward of a line joining Haycock and Green islands, with overfalls in places.

Galok, a long, narrow island, 541 feet high, lies close off the north-west extreme of Kalamion, surrounded by a reef which projects from its south-western end nearly a mile. Close off its northern part, and about a third its size, is Popototan island, from the western point of which a reef extends more than a mile south-westward. From Popototan a chain of islands and dangers extends across the strait that separates Kalamion island from Busuanga, and other dangers extend several miles northward; the outer of these only concern the navigator.

Kalamion or Kulion island lies off the south-west side of Busuanga, from which it is separated by a strait from 3 to 4 miles wide in its narrowest part, and in which are numerous islands and shoals. Kalamion is 19 miles in length, north-north-west and south-south-east, and its greatest breadth is nearly 10 miles. It is of irregular shape on its northern and eastern sides, but its western side is nearly straight. Maus mountain, with two peaks close together, in the southern part, rises to a height of 1,380 feet.

The island of Kulion has been reserved as a leper colony, and it is unlawful for any vessel to communicate with it without the permission of the Chief of the Kulion leper colony, Bureau of health.

Close to the south-western extreme is Dikabaito island, moderately high and wooded, which is distant $9\frac{1}{2}$ miles from the nearest part of Linapakan, page 59.

The channel between Dikabaito and Dikapululan, the first island to the southward, leading from the Sulu sea into the China sea, is about 3 miles wide and appears to be clear. The channel between Dikabaito and Kulion islands is about half a mile wide; it appears to be foul, and is not used by coasting vessels.

Plan 3401, Halsey harbour. Var. 1° 10' E.

HALSEY HARBOUR (Lat. $11^{\circ} 47' N.$, Long. $119^{\circ} 57' E.$).—Upon the west side of Kalamion or Kulion island, about $4\frac{1}{2}$ miles from its south point, is Alava island $1\frac{1}{2}$ miles in length, 6 cables wide, and 423 feet in height, lying in the entrance of Halsey harbour. This capacious inlet extends in an easterly and north-easterly direction for about 5 miles, with a general width of 4 to 7 cables, and depth from 14 to 20 fathoms, and affords good anchorage protected from all winds. Small handy vessels can enter the North Arm, passing through the narrow channel between Gage and Iguana islands, where the

General charts 2577, 967, 943, 2660b, 2661b, 1263.

Plan 5401, Halsey harbour. Var. 1° 10' E.

general depths are from 9 to 14 fathoms. The northern and north-eastern parts of the North Arm are very shoal, as is also the East Arm. Fresh water may be obtained in the cove on the southern shore eastward of Observation point.

A reef, with a chain of rocks above water upon it, projects $3\frac{1}{2}$ cables southward of Alava, and reef also surrounds the island to the distance of from one to 2 cables, stretching out as a broad flat with a least depth of $1\frac{1}{2}$ fathoms off the north-east end to $3\frac{1}{4}$ cables from the shore.

The channel eastward of Alava is only one cable wide between the reefs on either side which, however, are steep-to and can be plainly seen in sunlight, being of sand and coral and of a reddish yellow shade; the depth in the passage is from 11 to 20 fathoms throughout. The east extreme of Alava bearing N. by E. $\frac{1}{2}$ E. leads midway between the shore reefs in the narrow part of this channel.

There is no difficulty in entering Halsey harbour by Research channel, north of Alava; the shores on both sides are bordered by reef to the distance of about a cable, and vessels should keep in the middle of the passage, especially when off the north-east end of Alava, and when passing Observation spot point where the shore reef extends out $1\frac{1}{2}$ cables.

Tide.—It is high water, full and change, at Halsey harbour (Lat. $11^{\circ} 47' N.$, Long. $119^{\circ} 57' E.$), at 10h. 11m.; springs rise $4\frac{1}{2}$ feet.

Saddle rock.—At $2\frac{1}{2}$ miles N.W. by W. from the north-west point of Alava island is Saddle rock or islet, 114 feet high, surrounded by a reef and standing on the western extreme of a bank nearly a mile in length, which has two rocks awash near its eastern end. Depths of 10 to 12 fathoms are found close to the bank except off its north-east end, where there is a patch of $4\frac{1}{2}$ fathoms $2\frac{1}{2}$ cables northward of the eastern rock awash. When seen from the northward or southward the rock has the appearance of a saddle.

Charts 2577, 967.

Off-lying islands and dangers.—Foul ground.—The masters of several steam vessels have reported that shallow water and detached reefs extend from 5 to 7 miles in places off the whole of the western coast of Kalamion; the charts show no soundings here. The master of the steamer *Memnon*, May, 1901, however, reported that no dangers exist in this locality.

Several patches of 9 to 15 fathoms are charted from 20 to 30 miles westward of the island, with deep water around. Caution should be observed when navigating in the neighbourhood.

General charts 2577, 967, 943, 2660b, 2661b, 1263.

Charts 2577, 967, also plans on 944. Var. 1° 10' E.

Off the eastern side of the southern part of Kulion are a number of islands:—Dipalian, Guinlepen, Bulalakao, Minilay, Cheron, Tampil, Tambon and others unnamed, besides numerous shoals, for which *see* the chart. This area has not been surveyed, and should not be entered except in case of necessity.

KULION or KORON BAY is the name given to the great bay included between the islands Koron, Busuanga, Kulion, and Bulalakao. The southern entrance is between Kalis point and Guintungauan islet, which lies on the edge of the great reef that extends east-north-east from Bulalakao. Port Kulion and New Koron are the principal places in the bay.

ISLANDS IN KORON BAY.—**Guintungauan islet** lies about 3 miles south-westward from Kalis point, the southern extreme of Koron island, and marks the western side of the southern entrance to Koron bay. It is about half a mile in extent, wooded, and 153 feet in height. A ledge of sand and coral projects three-quarters of a mile east-north-east from it, and has 9 fathoms on its end, and at the same distance eastward from the islet, there is a coral shoal about 7 cables in extent, with a least known depth of 2 fathoms. The islet is connected with Bulalakao, as before mentioned.

Dunaun island (*Lat. 11° 52' N., Long. 120° 4' E.*) is a small moderately high island, lying close to the eastern point of Kulion.

Piedra Blanca is a rock 8 feet high, lying S 71° E., about 1½ miles from the north side of Dunaun island, and being white is easily recognised.

Chindonam island, about 2 miles in extent, lies close to the north-east coast of Kulion island. It is wooded, and has a rounded summit 400 feet high. On the southern side it is fringed by a reef which surrounds the islands Bugui and Inlulukut; a reef also extends nearly three-quarters of a mile south-westward from the east end of the island.

Uson island is 4 miles in extent east and west, of irregular shape, and low, with several hills, the highest of which is elevated 672 feet. There are some islets near it, and a reef surrounds the island to the distance of one to 2 cables, except at the south-east point where it projects 4 cables. There are also a number of dangerous detached shoals eastward of Uson island, which must be carefully avoided by vessels bound to New Koron.

Dimanglet island, nearly three-quarters of a mile long east and west and 250 feet in height, lies half a mile southward of the middle of Uson island.

General charts 943, 2661b, 1263.

Charts 2577 and 967. Var. 1° 10' E.

In western channel.—In the western approach to Koron bay, between Busuanga and Kulion islands, are the following, commencing from the westward:—

Northern side.—Maltatayok (*Lat. 12° 3' N., Long. 119° 51' E.*) is 150 feet high, with a white sand beach and spit on the east side, and low cliffs on the west side. Malkatop is 150 feet high, and apparently extends half a mile more southward than is shown on the chart. Luson islet is low; a coral reef extends about 2 cables south-east of its east end. Tangat is black, rugged, and steep, rising to a peak 1,200 feet high.

Southern side.—Malbinchilao is 150 feet high. Dikalatan is low with a white beach on the eastern side. Lajo is 450 feet high, and has a cone-shaped summit. Dimanglet islet, like all the islands, is covered with trees to the water's edge; it is about 250 feet high, and is fringed on the north side by a coral reef. Marili is about 300 feet high and thickly wooded. Chindonam island is described on page 54.

There are a number of other islands in the western channel, some with and some without names. They are out of the ordinary track of navigation, and their position will be best understood by reference to the chart.

DANGERS.—A reef, over which there is a depth of 9 feet, is situated in Koron bay, northward of the north point of Bulalakao island, and about midway between Kalis point and the eastern extreme of Dunaun island. This reef, the position of which is doubtful, is about 2 miles long, one mile wide, and consists of large coral boulders.

Animosa rocks, lying in the track from Kalis point to Kulion point, are plainly marked by discoloured water, and are awash at low water; from them Piedra Blanca, distant $1\frac{1}{4}$ miles, is nearly in line with Dunaun island, bearing about W. by N.

A shoal of less than one fathom is shown on the chart as lying N. 36° W., $5\frac{1}{2}$ miles from Kalis point, and nearly one mile from the coast of Koron.

A coral shoal, of small extent, with 3 fathoms water and 20 fathoms close around, lies with Kulion fort bearing W. $\frac{1}{4}$ N. and the eastern side of Chindonam island N. by W. $\frac{1}{2}$ W.; a larger reef, which generally breaks, and is marked by a beacon with topmark, lies off the entrance of Port Kulion, about $2\frac{1}{4}$ miles E. $\frac{1}{2}$ N. from the fort.

There is also a small patch lying about midway between the east end of Chindonam and the western extremity of Koron island, on which the least depth shown is $3\frac{1}{2}$ fathoms.

There are other shoals shown northward of Bulalakao and eastward of Tampil island, for which *see* the chart.

General charts 943, 2661b, 1263.

Plan of Port Kulion on 944. Var. 1° 10' E.

PORT KULION is a sheltered inlet on the north-east coast of Kulion island, in Koron bay; it is 6 cables in length, in a north-east and opposite direction, but its available width is contracted to one cable by reefs on both sides; the reefs at the entrance are marked by beacons with topmarks. A stone pier with wooden extension, having 28 feet of water at the end, projects from the western side of the port. A little farther up on the same side is a ruined mole. The town of Kulion, the site of the leper colony, on the north side of the port, consists of about 100 houses built on posts, and has about 500 inhabitants; a fort and a church within it, on the summit of the western entrance point, are conspicuous.

Vessels are not allowed to go to the wharf or communicate with the town without permission; *see* page 52.

LIGHT (*Lat. 11° 54' N., Long. 120° 1' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 115 feet above high water, from a pole 11 feet high, on the bastion of the fort on the northern side of entrance to Port Kulion.

Anchorage.—There is good sheltered anchorage, in 9 fathoms, south of the mole, but it is necessary to moor as the place is confined; vessels 200 feet in length should secure head and stern. Anchorage can also be had east of the fort in a depth of 15 fathoms, mud; farther out the depths are from 17 to 25 fathoms.

The trade consists of tobacco, turtle-shell, trepang, pearl-shell, and birds' nests.

Supplies.—Fowls, pigs, and cattle are procurable, but not abundant. Water can be had from a well in the little bay north of the town.

Communication.—A small steam vessel visits the port once a month on her way from Manila to Cuyo and Samboanga, and again on her return to Manila.

Plan of harbours S. side of Busuanga island on 944.

Port Uson, on the south coast of Busuanga, lies between Uson island and the shore; it is spacious, landlocked, and offers good sheltered anchorage in depths of from 4 to 12 fathoms, but the entrances at either end of Uson island are narrow.

The eastern entrance is $1\frac{3}{4}$ cables wide, with 4 fathoms least water; the western entrance is about the same width, but with not less than 10 fathoms in the fairway; southward of the western entrance are two rocky shoals with little water over them named Fondo claro and Fondo oscuro, lying about 4 cables apart, and surrounded by deep water on all sides.

Tide.—It is high water, full and change, at Busuanga, at 12h. 30m.; springs rise 6 feet.

General charts 2577, 967, 943, 2661b, 1263.

Charts 2577, 967, and plans on 944. Var. 1° 10' E.

DIRECTIONS.—Trading craft from the eastward approach Port Kulion and Port Uson by Koron passage, before mentioned, but it requires local knowledge.

To enter Kulion bay from the southward, approach with Kalis point bearing N. 1° W., and when one mile from the point steer N. 46° W. for Tangat island, which is 1,200 feet high and easily recognised. There is a conspicuous gap in the ridge of Koron island, distant about 1½ miles from its southern extremity, which if kept astern bearing S. 78° E. will lead clear of all dangers up to the old fort of Kulion port (*Lat. 11° 54' N., Long. 120° 1' E.*).

Western channel.—The approach from the westward is between Kulion and Busuanga and presents no difficulty, but it has not been surveyed; the islands on both sides of the passage are only sketched in on the chart, so that considerable care is necessary when navigating it; *see view a*, at page 58.

Vessels entering Koron bay by this channel pass on either side of Nalaut (Green) island, and steer for the summit of Tangat island in line with the north end of Malbinchilao, bearing S. 73° E., which course leads southward of a 3-fathoms patch lying southward of Maltatayok island, the first one on the north side of the channel; round the north end of Malbinchilao and when about a cable eastward of it steer S. 53° E., until Dikalatan island bears S. 12° W., when the course should be altered eastward, keeping towards the north shore of Lajo island to avoid the reef extending southward from Kalumbajan, the island north of Lajo. Continue eastward until the west end of Luson islet bears S. 66° E., when alter course to S. 62° E., keeping towards that islet to avoid the reef off Marili island. When up with the islet off the south end of Luson steer to pass half a mile southward of Tangat island.

If bound southward shape a course to give the east end of Chindonam island a berth of at least half a mile to avoid the reef which extends more than 3 cables eastward of that island, and if proceeding to Port Kulion steer to pass between the reef marked by a beacon in the middle of the bay, and that extending southward from Chindonam island, both of which are generally visible and break with little sea.

If bound eastward, continue south-eastward from abreast Tangat island until Dimanglet island, south of Uson island, bears N. 80° E., when the course may be altered eastward, heading for Balolo point, Koron island. For islands in western channel, *see* page 55.

Harbours S. side of Busuanga island on 944.

New Koron (*Lat. 12° N., Long. 120° 12' E.*) is situated on the south side of Busuanga island, about one mile from Koron passage.

General charts 2577, 967, 943, 2660b, 2661b, 1263.

Harbours S. side of Busuanga island. Var. 1° 10' E.

Vessels bound for New Koron having passed between Makinit islets and Makinit island, should round Koron point, giving it a berth of at least $1\frac{1}{2}$ cables, and steer for Kanitauan island, anchoring in 10 fathoms when the east end of Uson island bears S. 37° W. and Koron point S. 71° E.

Chart 2577, Between San Bernardino and Mindoro straits.

Off-lying islets south-east of Kulion island.—**Malaposo islets** comprise a small group of rocks standing upon a reef situated $3\frac{1}{2}$ miles S. 18° W. from Guintungauan islet, and about 2 miles from the south-eastern end of Bulalakao. The largest islet is about 175 feet high, cone-shaped, composed of rock and clay of a reddish appearance, and is the most conspicuous mark in the vicinity.

Kalumbuyan, $3\frac{1}{2}$ miles west-south-west from Malaposo islets, has a distinctive cone-shaped peak of a reddish-brown colour. It is surrounded by a reef, and has a small islet off its south-west extreme. A shoal of coarse gravel, with $4\frac{3}{4}$ fathoms on it, is charted about $1\frac{3}{4}$ miles eastward of Kalumbuyan, extending north-eastward towards Malaposo.

Kanipo (*Lat. 11° 40' N., Long. 120° 6' E.*), lying $1\frac{3}{4}$ miles south-westward of Kalumbuyan, and 7 miles eastward of Dikabaito island, is a small and comparatively verdant island; its northern half is surrounded by a reef nearly half a mile in width.

A 5-fathoms shoal is charted at $1\frac{3}{4}$ miles south-eastward of Kanipo.

Tres Reyes, a group of small rocky islets about 60 feet high, lie about 7 miles S.E. by E. from Dikabaito, and nearly $4\frac{1}{2}$ miles S. by W. of Kanipo.

Three reefs, with 3 fathoms of water on them, lie at distances of $4\frac{1}{2}$, 6, and $8\frac{1}{2}$ miles respectively eastward of Tres Reyes islets.

SHOALS EAST AND SOUTH-EAST OF THE KALAMIANES.—**Framjee bank**, on which the British ship *Merwangee Framjee* is reported to have touched in 1878, was examined by the boats of H.M.S. *Flying Fish*, but nothing less than 5 fathoms was found. From the position of least water the islet Lubutglubut, south-west of Kalanhayaun, bore N. 36° W., and the summit of Delian S. 57° W. The bank extends about 3 miles in a south-west and north-east direction, has a general depth over it of 8 to 13 fathoms, and 40 to 50 fathoms around.

Magallanes bank has $1\frac{1}{2}$ fathoms least water on its northern end, whence it extends nearly 3 miles south-westward. From the position of least water Kalis point bears S. 72° W., distant $12\frac{1}{2}$ miles.

General charts 2577, 967, 943, 2661b, 1263.



Panadikun I.
N. 66° E.

Maltayok I.

Taang I.
S. 71° E.

Western approach to Koron bay, Kalamianes group.



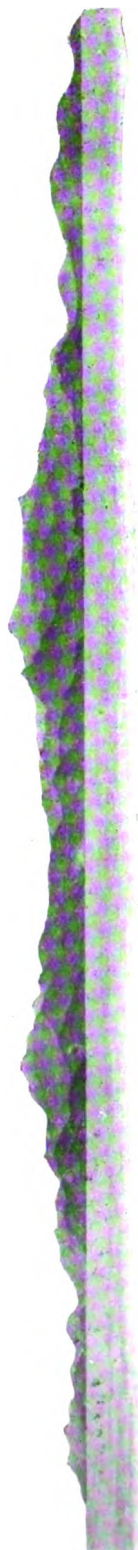
Matubutubut
(Observatory) I.



Katibangbagan (Hastings) I.

Ilok (Austin) island.

Binudulan (Cleopatra) I.



East peak.

Palawan island.

Passage between Linapakan and Palawan from the north-west; 3 views.

Chart 2577, Between San Bernardino and Mindoro straits.

Narvaez bank, with $4\frac{1}{2}$ fathoms least water, lies $1\frac{1}{2}$ miles southward of Magallanes bank, with Kalis point bearing West, distant about 11 miles.

Aguirre bank, S. 66° E., 17 miles from Delian island, is $1\frac{1}{2}$ miles in extent; the least water on it is $4\frac{1}{4}$ fathoms.

Areta shoal, of coral and sand, position doubtful, is charted about 8 miles northward of the Kiniluban group, in lat. $11^{\circ} 35'$ N., long. $120^{\circ} 46'$ E. Near this position a depth of 9 fathoms was obtained by the British ship *Areta* in 1863, and of 7 fathoms by the *Monarchy* in 1877.

Panay shoal (Lat. $11^{\circ} 33'$ N., Long. $120^{\circ} 25'$ E.).—The U.S.S. *Panay*, in May, 1901, when about 18 miles S. 33° E. from the south end of Koron island, with Nangalao island bearing S. 70° W., passed over a reef of sand and coral, about $1\frac{1}{2}$ miles in diameter, the least water found being $6\frac{1}{2}$ fathoms. A stump of a tree about 15 inches in diameter projects about 5 feet above water on the southern end of the reef in 9 fathoms.

Alpha shoal, with a depth of 6 fathoms, and 12 fathoms close-to, lies nearly 4 miles N. 80° E. of the north end of Delian.

Beta shoal, of 6 fathoms, with 20 fathoms close-to, lies 7 miles S. by E. of Delian island.

ISLANDS NORTH-EAST OF PALÁWAN ISLAND.

Charts 967, 2577. Var. $1^{\circ} 10'$ E.

LINAPAKAN ISLAND (Lat. $11^{\circ} 28'$ N., Long. $119^{\circ} 48'$ E.) is the largest of an extensive group lying between the north-east coast of Paláwan and the Kalamianes, distant 11 or 12 miles from the former. It is about 9 miles in extent east and west, and has two deep bays on the north and one on the south side, with several islets and rocks lying off the prominent points. In the eastern bay on the north side, are several steep conical heads. The shore of this bay in the southern part is reported to be fringed by a wide reef, and in the western part there is a large bight, not shown on the chart, the shores of which are also fringed by reefs. In the centre of this bight perfectly sheltered anchorage may be found for small craft in 10 fathoms, muddy bottom, in a basin about $1\frac{1}{4}$ cables in diameter.

In the south-west corner is the settlement of St. Nicholas, comprising a stockade and a few houses. There is a depth of 19 fathoms at a mile from the settlement; but the approach to the bay has not been sounded, and no part of the southern face of the island has been examined.

General charts 943, 2660b, 2661b, 1263.

Charts 2577, 967. Var. 1° 10' E.

The village of Linapakan is stated to be on the east coast, behind Patoyas island. Anchorage may be had in 15 fathoms about three-quarters of a mile northward of the village. There is no difficulty in entering from the northward, giving a fair berth to all rocks and islands. The channel south of Patoyas island is apparently foul. The reef in approaching the village rises abruptly from deep water.

Linapakan is nearly surrounded by a great number of small islands and rocks; those on the north-eastern side forming an almost continuous chain toward Dikabaito, the southernmost island of the Kalamianes, from which Dikapululan, the north-eastern island of the chain, is separated by an unsurveyed but apparently clear channel, referred to on page 52. Very few of the islands have been surveyed, and the channels between them have not been sounded. Pangandauan island, $2\frac{3}{4}$ miles westward of Dikapululan, has a sunken rock half a mile northward of it; Binalaba lies $1\frac{1}{2}$ miles south-eastward of Dikapululan, and the other principal islands are Dimankal, Alijara, and Patoyas (with the Kurianas islets east of it), towards the east, and Phantom (Escucha), Double (Dimanglet), Alerta, and Vanguardia towards the west; for others, *see* the chart.

Malubutglubut (Observatory) island, lying east-north-east 10 miles from the north extreme of Paláwan, is the north-westernmost of the Linapakan group. It is 758 feet in height, and when first seen from the northward, appears as a conical hill. The island is $1\frac{3}{4}$ miles in extent, and has at its north extreme a saddle head, with a slip or water-course down it, connected by a low neck of land, on either side of which are sandy bays. View *b*, at page 58.

Observation spot, a small rocky point, where observations were usually taken by the officers of the *Royalist*, in the bay on the west side of Malubutglubut island, is in latitude $11^{\circ} 30' 15''$ N., long. $119^{\circ} 39' 30''$ E.

The channel between Malubutglubut island and Linapakan is barely $1\frac{1}{2}$ miles wide, and has upwards of 30 fathoms water. A strong current (depending in velocity and direction on the prevailing winds) will be found usually setting through it.

Tides.—It is high water, one day after full and change, at Malubutglubut island at 11h.; maximum rise observed, $5\frac{1}{4}$ feet.

Base reef (*Lat. $11^{\circ} 33' N.$, Long. $119^{\circ} 38' E.$*), lying N.W. by N. nearly $3\frac{3}{4}$ miles from the high part of Malubutglubut island, is about 30 feet in length, and always visible; between it and the island are two rocks awash.

Nanga islands, consisting of four islands and some peaked rocks, lie from $1\frac{1}{2}$ to 2 miles off the south-west face of Malubutglubut island.

General charts 943, 2660b, 2661b, 1263.

Charts 967, 2577. Var. 1° 10' E.

Kalibangbagan or Hastings island, situated about 8 miles eastward of the north point of Paláwan, is the south-western-most of the Linapakan group. It is $2\frac{1}{2}$ miles in length, north-west and south-east, and has several peaks, the highest being near its south extremity, where just off the point are an islet and some rocks awash. Northward of the island, between it and Nanga islands off Malubutglubut, are two peaked islets.

Passage.—H.M.S. *Encounter*, in April, 1880, passed from the Sulu sea to the China sea, westward of Linapakan. See views *b, c, d*, at page 58.

A small group, composed of two islands and several islets, is situated about 12 miles eastward of Linapakan.

Kabulauan, or Sombbrero (*Lat. 11° 24' N., Long. 120° 4' E.*), is $2\frac{1}{2}$ miles in length north-west and south-east, with a hill about 700 feet in height near its north-east point. On the south-west side there is a small bay bordered by a reef, with depths of 4 to 11 fathoms, affording good anchorage in the north-east monsoon. The north side of the island is foul. On the south side there is a rock which appears to be connected with the island by a reef covered with $2\frac{1}{2}$ fathoms water; at 2 miles west of the island there is a patch of $4\frac{1}{2}$ fathoms.

A rock, the existence of which is doubtful, is charted 6 miles S. 63° E. from the south-eastern point of Kambulauan.

Nangalao, $4\frac{1}{2}$ miles north-east of Kabulauan, is about $2\frac{1}{4}$ miles in length north-east and south-west, and rises to a central hill about 500 feet in height. A reef on which the sea breaks extends about one mile northward from the north point; at the distance of less than 2 miles in the same direction from the north point, there is a shoal with a depth of 8 fathoms on it. Two islets, joined to the south point by a reef, form a bay with depths of 5 to 11 fathoms.

The channel between Nangalao and Kabulauan has not been sounded; there is an islet in the middle of it.

A patch of 7 fathoms, the position of which is doubtful, is charted 10 miles S. 78° E. from the north-east point of Nangalao, with Kanaron island bearing S. 22° W., distant 12 miles.

Kanaron island, lying S.E. $\frac{3}{4}$ E. 13 miles from Kabulauan, is small, about 300 feet high, and bordered on the north side by reefs and rocks to the distance of one mile.

Solitario, 40 feet high, lies 5 miles N.E. $\frac{3}{4}$ E. of Kanaron; and Salimbubuk, 100 feet high, lies $4\frac{1}{4}$ miles N.N.W. $\frac{3}{4}$ W. of Kanaron.

Charts 2577, 2578, 2576, 967. Var. 1° 30' E.

SULU SEA.—The space included between Mindoro to the north, and the Sulu archipelago to the south, and having Panay, Negros,

General charts 943, 2660b, 2661b, 1263.

Charts 2577, 2578, 2576, 967. Var. 1° 30' E.

and Mindanao on the east, and Paláwan on the west, is distinguished by the name of the Sulu sea. Although of great depth, 2,550 fathoms in one place, this sea, which is connected with the China and Célebes seas, and also with the Pacific by San Bernardino and Surigao straits, has a minimum deep-sea temperature of 50·5°, reached invariably at 400 fathoms. As this temperature in the China sea is at the depth of 200 fathoms, in the Célebes at 180 fathoms, and in the Pacific at 230 fathoms, it may be inferred that the Sulu sea is prevented from freely interchanging its waters with those seas by ridges which do not exceed those depths.

Winds.—In the Sulu sea easterly winds with fine weather prevail in October, the N.E. monsoon not being established until November. In January and February the monsoon blows hardest, but not with the force experienced in the China sea; it is felt strongest before the openings between Panay and Negros, and Negros and Mindanao. At the end of May south-west winds begin to blow, and in a month become established, to terminate in October, bringing with them a season made up of rain squalls and tempests, which take place principally in July and August. In September a heavy mist hangs about the coast of Mindanao.

In the Sulu sea the east or north-east monsoon is not a fresh steady breeze, but is often variable. Near Mindanao the northerly winds never blow fresh, and light changeable winds frequently displace them for several days. This often occurs at the end of January, and it is considered that the same winds prevail from the Sulu archipelago to Manila (*Lat. 14° 36' N., Long. 120° 57' E.*).

Cyclones occur occasionally, chiefly at the changes of monsoon, and appear to pass chiefly over the northern part of the sea.

Currents.—During the north-east monsoon the surface drift is with the wind about three-quarters of a mile an hour. In the southern part of the sea there is generally a north-west or westerly current in the narrows between Sulu and Basilan, and thence to Balábac strait. In March and April the current sets mostly to the eastward among the Sulu islands, but it sets to the westward at the same time in the openings of the Philippine islands to the north of Mindanao.

Great caution should be used at all times, and particularly during the prevalence of the north-east monsoon, in the navigation of the southern part of the Sulu sea, on account of the strength of the currents, which are strongest when the wind is fresh from the northward. The steamer *Kudat* is stated to have been set 48 miles to the southward during one night when steering from Taganak island to a

General charts 943, 2660b, 1263.

Charts 2577, 2578, 2576, 967. Var. 1° 30' E.

position 28 miles north of Pangutarang island; in the morning she was found to be south and west of Cap island.

Observations of the currents during the south-west monsoon are too scanty to afford reliable information, but the stream may be expected generally to set north-easterly at the rate of about one knot an hour, increasing in strength to $1\frac{1}{4}$ or $1\frac{3}{4}$ knots on the eastern side of the Sulu sea, and to trend more easterly in direction as the openings between the larger islands are approached.

Tidal streams.—Two tidal waves enter the Sulu sea and passages between the Philippine islands from opposite directions; one from the China sea through the western openings, the other from the Pacific through the eastern straits, viz., San Bernardino, Surigao, and Basilan. These waves meet in the many channels between the southern islands.

The wave from the China sea enters that sea from the Pacific by the wide opening between Formosa and Luzon, and passes from north to south along the western shores of Luzon and Paláwan, and through the Verde island passage, Mindoro strait, Linapakan and Balábac straits.

The Verde island stream, after passing south along the coast of Luzon and deflecting some of its waters into the bay of Manila, continues along the coast to the southward and eastward as far as Púnas point (*Lat. 13° 36' N., Long. 121° 17' E.*), where it branches. One stream runs to the north-east round Tayabas bay, and north and east of Marinduque, through Mompog pass, reunites with the other branch which passes south-east along the Mindoro coast as far as Dumali point, and then to the eastward, south of Marinduque as far as the Bondog peninsula, where it meets the flood stream from the Pacific, which has passed through San Bernardino strait. The northern part of the Verde island stream, which follows round Balayan and Batangas bays, reunites with the principal stream near Verde island, producing violent tide rips and eddies in that part of the channel between Malabrigo and Escarceo points.

The flood stream that enters by Mindoro strait follows the coast of Mindoro, part of it continuing round the coast of that island to the northward to Dumali point, where it meets the stream through Verde island passage. The rest of the stream sets south-easterly and divides at the north-west point of Panay island, one branch flowing along the north coast of Panay past Bulakau point and the Gigantes islands to Bulalaki point, the north extreme of Sebu, where it turns to the southward and meets the stream from the Pacific through Surigao strait, about 6 miles south of Kamotes islands. It also flows into Iloilo strait and Tañon strait, in both of them meeting the flood

General charts 943, 2660b, 1263.

Charts 2577, 2578, 967. Var. 1° 30' E.

which has entered from the southward, on the parallels of the north end of Negros, and of Tajao point (*Lat. 10° 21' N., Long. 123° 35' E.*) respectively.

The other branch, turning to the southward from the north-west point of Panay, and being joined midway by the stream setting eastward from Cuyos islands (or Linapakan strait) continues coasting Panay and Guimaras islands into Iloilo strait, until it meets the other branch described above. Between the Kalamianes and the north end of Paláwan the flood stream sets south-east and the ebb north-west.

The flood entering by Balábac strait, turning to the north-north-east along the east coast of Paláwan, spreads itself like a fan over the Sulu or Mindoro sea from north-east to east, forming the easterly stream felt between Cuyos islands and Panay, and also that which sets to the south of Kagayanes, where it is said to meet the stream from Surigao strait (and Sebu sea) approximately on the meridian of Kagayanes.

In the Sibutu passage the flood stream sets to the north-westward; and also in the Sulu archipelago the flood stream sets generally northward and westward, but takes many local directions among the islands, where it also appears to be influenced by the monsoon currents. In the channels between the Sulu islands the tidal streams are strong and irregular, and overrun the times of high and low water by from 2 to 3 hours.

Through Basilan strait the flood stream sets to the westward, and passes up the west coast of Mindanao to the northward until it meets the flood stream from Surigao strait somewhere midway on the coast.

The time of high water of the wave that enters from the China sea seems to be from 10 to 12 hours, and of that which comes from the Pacific through the eastern and northern straits from 6 to 7 hours.

Charts 2577, 2578.

CUYOS ISLANDS.—This group occupies a circular space of about 45 miles diameter, on a bank covered by depths of 14 to 50 fathoms, with deep and generally clear passages between the islands. The group is situated eastward from the northern part of Paláwan island and can be passed on either side, but the route to the eastward is more direct and is generally used in the north-east monsoon from Mindoro strait to Basilan strait. All the islands, with the exception of Kiminatin, are of volcanic formation.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.

Kiniluban group (*Lat. 11° 25' N., Long. 120° 50' E.*), the northernmost of the Cuyos islands, consists of several islands and rocks on a circular reef about 6 miles in diameter. The easternmost

General charts 943, 2660b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E. and largest island of the group is about 2 miles long north-west and south-east, and one mile broad, and rises to a central hill 981 feet in height; it is precipitous, and almost bare. The northern ends of the islands are very abrupt, and terminate in jagged needle-shaped rocks. An opening in the south side of the reef leads to the south-west island, which is sparsely populated, but has a church and school.

Anchorage may be found off the opening, on the edge of the reef, in a depth of 10 or 12 fathoms, with Kiniluban summit bearing N. 57° E., and Oko islet S. 26° E.

White rock, 30 feet in height, lies S. 31° E. 3½ miles from the largest of the Kiniluban islands, and has a sandbank with bushes lying half a mile south-west of it, joined to the rock by a breaking ledge, with apparently shallow water for a quarter of a mile further out.

Pamálíkan island, low and sandy, covered by bushes, and surrounded by a reef, lies about 7 miles south-westward from the largest of the Kiniluban group, the passage between being 2¼ miles wide.

Manamok island, lying 2¾ miles south-westward of Pamálíkan, is 714 feet in height, and surrounded by a reef projecting south-eastward one mile. The eastern side is precipitous, but the western side slopes gently from the summit, and juts out in a V-shaped peninsula with a cone at the end. The western side has trees fringing the beach, and is cultivated. Pigs, fowls, and cocoanuts have been obtained here.

Anchorage may be had off the south-west edge of the reef in 7 fathoms, with the summit of the island bearing N. 35° E., and Imaruan island S. 49° E.

A bank, with depths of 6 to 10 fathoms, lies 6 miles eastward of Manamok; its extent has not been determined.

Charts 2577, 2578.

Islets.—The islets Lean 210 feet, Imaruan 466 feet, and Oko 356 feet in height, lie respectively, South 5 miles, S.E. ¾ S. 4½ miles, and E.S.E. 9½ miles from Manamok; they all appear to be steep-to. A bank with depths of 14 to 19 fathoms, sand, extends 2 miles north-eastward from Lean islet; a depth of 9 fathoms has been obtained one mile north-west of Oko.

Dit island, about 1½ miles in extent, rising in the centre to a peak 860 feet in height, is steep-to except on its south-west side, where a reef appears to extend about half a mile.

General charts 943, 1263.

Charts 2577, 2578. Var. 1° 10' E.

A shoal of 6 fathoms has been reported to lie $4\frac{1}{2}$ miles north-north-eastward of Dit island, but H.M.S. *Flying Fish* failed to see anything of the shoal when passing over and around the site; its existence is doubtful.

Marakanao (*Lat. 11° 13' N., Long. 121° 4' E.*), 500 feet in height, is a small island, steep-to, situated 7 miles eastward of the southern end of Dit island, and is the north-easternmost of the Cuyos group.

Chart 2577, Between San Bernardino and Mindoro straits.

Chinaman shoals are two coral patches, each about one mile in extent, and with a depth of 19 fathoms between them, lying on the north-eastern edge of the bank. The outer shoal, with a least depth of 5 fathoms, lies N. 24° E. $5\frac{1}{2}$ miles, and the inner patch of 4 fathoms N. 7° E. 3 miles from Marakanao. Immediately north-eastward of Chinaman shoals the water deepens rapidly to 46 fathoms, but eastward and southward of them the bank seems more sloping. A depth of 11 fathoms has also been obtained N. 36° E., $4\frac{1}{2}$ miles from Marakanao.

Sultan bank, one mile in extent, with a least depth of 7 fathoms and steep-to, lies about N. 65° E., distant 23 miles from Marakanao.

Bennington bank.—A depth of 9 fathoms was obtained (1899) about 7 miles north-eastward of Sultan bank in lat. 11° 28' N., long. 121° 31½' E.

Also chart 2578.

Shoals, with a depth of 10 fathoms, are charted respectively S. 82° E. distant 8 miles, and S. 86° E. distant 17 miles from Marakanao island; the latter is named Luzon shoal.

Chart 2578, E. part of Sulu or Mindoro sea.

Agutaya island (*Lat. 11° 9' N., Long. 120° 58' E.*), about 3 miles in length, north-east and south-west, and 2 miles in width, is situated about midway between Kiniluban group and Cuyo island; it is surrounded by a reef which dries out about half a mile on its western side, and is steep-to. The south-western part of the island is a smooth round back, 405 feet high; to the north-east it rises in three hills, the highest of which attains an elevation of 950 feet. A village and fort are on the south-western side near the western point, with an estimated population of about 300.

Anchorage.—H.M.S. *Flying Fish* anchored off the reef on the south-west side of the island in 14 fathoms, with the west extreme of Agutaya in line with the peak of Dit islet.

A group of pointed rocks, about 15 feet above high water, lies N. 69° W., $3\frac{3}{4}$ miles from the north extreme of Agutaya; and a group

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

of rocky islets, named Guinlabo, 223 feet high, lies 2 miles southward of the island.

A rock, with a depth of 3 feet, was reported by the British ship, *Belted Will* (1880), to lie S. 16° E., distant $7\frac{1}{2}$ miles from the peak of Agutaya, with Paya islet bearing West. The *Flying Fish* passed over this locality in 1886, but no signs of the rock were seen; its existence is doubtful.

Matarabis islet, situated about 10 miles eastward of the south end of Agutaya, appears to be steep-to. It is very conspicuous, and is distinguished by a conical mountain top 457 feet in height.

Plan of Cuyo island anchorage on chart 2578.

Cuyo island is the most important of the group; its length, including Mount Bombon at the northern end rising to a height of 830 feet, and which is joined to it by a low, narrow neck covered with trees, is a little over 7 miles, and its greatest width is 4 miles. The western side is bordered by reefs; a shoal extends about three-quarters of a mile from the south-east point; the eastern side has not been closely examined, but is shown bordered by a narrow reef which appears to be steep-to. From its shores the island rises gradually to a central peak, named Aguada, elevated 608 feet above the sea. The island had 7,845 inhabitants at the last census.

Bisukay is a small island, 386 feet high, close to the south-west part of Cuyo, and affords shelter during the south-west monsoon. The channel between it and Cuyo is very much narrowed by reefs, and only used by small craft.

Pandan islet, about 50 feet high, lies 4 miles west of Bisukay. When seen from the eastward it appears like two islands, and is a good mark to steer for on leaving Cuyo. A bank of sand and coral, with a depth of 7 fathoms on it, is situated about 2 miles N. 43° W. from Pandan.

Putik (*Lat. 10° 55' N., Long. 121° 3' E.*) is an islet, 440 feet in height, on the north-west edge of the reef bordering Cuyo island. Indagamy, 158 feet high, is rocky and steep-to. A rock, 85 feet high, lies about one cable north-eastward, and another, 10 feet high, lies one mile westward from Indagamy.

Kanipo island, about $1\frac{1}{2}$ miles in diameter, and rising to a height of 517 feet in the centre, lies $5\frac{1}{2}$ miles north-west of Putik, on the bank extending in that direction.

Bararin is a small wooded island, 321 feet high, situated N. 73° W., distant 4 miles from the pier at Cuyo. A reef extends about a quarter of a mile from the south-eastern side.

General charts 2578, 943, 1263.

Plan of Cuyo island anchorage on chart 2578. Var. 1° 10' E.

Depths.—In the area included between the islands Cuyo, Kanipo, Bararin, and Bisukay, the depths are irregular, and generally under 10 fathoms, with patches of $2\frac{1}{2}$ to $4\frac{1}{2}$ fathoms in places. These patches only show when looked down upon from a height, or when the light is favourable. One of these shoals, a patch of $4\frac{1}{2}$ fathoms, lies on the eastern side of a 7-fathoms bank, and in the fairway to Cuyo road, with Aguada peak bearing E. by S. at a distance of $2\frac{1}{4}$ miles from the shore. It is reported that there is less water in this area than is shown on the chart; coral heads have been seen covered by apparently not more than 4 or 5 feet of water, between Cuyo and Kanipo.

Patches of 10 fathoms lie N. 76° E. and S. 75° E. at a distance of 5 miles from the north end of Kanipo island, and a patch of 9 fathoms lies 5 miles S. 88° E. from the same point.

Light (*Lat. $10^{\circ} 51' N.$, Long. $121^{\circ} 0' E.$*).—A red fixed light, elevated 32 feet above high water, and visible 7 miles in clear weather, is exhibited at the town on Cuyo island, from the old tower, 27 feet high, on the pier end.

Anchorage.—There is anchorage in the open roadstead off the town of Cuyo in from 7 to 18 fathoms. There is good anchorage, on sandy bottom, westward of the town, in a break in the reef. Small vessels may anchor off the end of the pier, protected from all winds except those from south-west. See Directions. During the south-west monsoon, vessels are sometimes obliged to seek shelter close to the northern side of Bisukay island. The *Flying Fish* anchored in 7 fathoms, with Aguada peak S. 79° E., Bombon summit N. 54° E., and the islet Silat, seen in the gap between Cuyo and Bisukay, S. 10° W. This is the anchorage used by the monthly steamer from Manila.

Buoys.—A black can buoy marks the northern side of the entrance to the anchorage, and a red nun buoy the southern side; both buoys are moored in 3 fathoms.

Directions.—Vessels bound for Cuyo should bring the pagoda at the end of the pier to bear N. 78° E., and steer for it, passing midway between the points of the reef and anchoring 250 or 300 yards from the end of the pier in $2\frac{1}{2}$ or 3 fathoms, sand. The depth at the entrance is 4 fathoms, decreasing gradually toward the pier. The usual track of vessels bound to and from Cuyo is between Bararin and Bisukay islands.

Tides.—It is high water, full and change, at Cuyo island at 11h. 30m.; springs rise 6 feet.

The town, situated on the western side, is well kept, with regular streets of houses raised on piles, lined with cocoanut trees. There is a

General charts 2578, 943, 1263.

Plan of Cuyo island anchorage on chart 2578. Var. 1° 10' E.

church within an old fort built on a sandspit extending from the northern part of the town. A stone pier, on the end of which there is a dilapidated pagoda, extends westward from the middle of the town.

Supplies.—Cuyo is very fertile, and produces cacao, coffee, cotton, maize, rice, cocoanuts, oranges, bananas, and pine-apples. Cattle, horses, pigs, and fowls can be obtained, but supplies of all kinds are scarce and dear; water obtained from wells, and depending on the rains, is scarce and indifferent.

Communication.—A steamer leaves Manila every fourth Wednesday with mails for Kulion, Cuyo, Princessa (Paláwan), Balábac, Sulu, and Samboanga, returning *vice versa* to Manila, completing the round to Manila again in 16 days. Cuyo is connected with San José de Buenavista in Panay, by telegraph cable.

Chart 2578, E. part of Sulu or Mindoro sea.

Siparay islet, lying 9 miles N. 24° E. of Cuyo, is small, rugged, and has a remarkable pinnacle rock on its south side; the *Flying Fish* anchored south-west of the islet in a depth of 10 fathoms. Takbubuk, 3 miles south-westward of Siparay, also small, is smooth and bushy.

Tagauayan, nearly 3 miles in length north-west and south-east, consists of two islands united at low water by a ledge; they lie 9 miles east-north-east from the north end of Cuyo, and are the easternmost islands of the group. There is no anchorage off Tagauayan.

Kokoro (*Lat. 10° 53' N., Long. 121° 12' E.*), a small islet lying 7 miles eastward of the north end of Cuyo, is bordered by a narrow reef, and rises to a double mound near its south side, off which it is steep-to. The islet is inhabited, and under cultivation.

Paya (*see par. below*), Patunga (455 feet), Pamitinan, Lubik (478 feet), and Kauayan (230 feet) need not be specially described; they are small, hilly, and steep-to, and lie west-north-westward of Cuyo.

Tabak, a group of rocks 8 feet above water, with a shoal that breaks one cable north-east of it, is situated westward of the above islets, and N. 69° W. 24 miles from the town of Cuyo; there are depths of 20 fathoms all round these rocks at the distance of half a mile.

Paya rock (there is an islet of this name 21 miles north-eastward), the westernmost islet of the Cuyos group, 90 feet high, and composed of basalt, is steep-sided, and has only pandanus growing at the top; there is deep water all round it at the distance of half a mile. It lies S. 78° W., distant 24 miles from the town of Cuyo.

A bank with a depth of 7 fathoms over it is situated 2 miles S. 78° E. from Paya rock.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

South and south-west of Cuyo island are several islets: Imalaguan (303 feet), Silat, Kapnoyan (449 feet), Malkatop, and Pangatatan, which need not be described in detail; they are all steep-to. Kapnoyan, 7 miles south-west of Cuyo island, is the only one of these inhabited.

Kiminatin (*Lat. 10° 43' N., Long. 120° 48' E.*), 6 miles west of Kapnoyan, composed of lime-stone, and rising abruptly from a depth of 30 fathoms, is steep and almost inaccessible, the sides being underworn to a height of 14 feet above the sea. Its summit shows two peaks, the eastern being the higher, when seen from northward or southward. A stunted bush grows on it in places.

Kiminatin-chico, one mile westward, is composed of crystalline lime-stone, and is surrounded by reef, with a patch of $4\frac{1}{2}$ fathoms off its south-east part. In this islet the sea has worn some curious caves.

Santa Filomena shoals are three patches of 2, 3, and $3\frac{1}{2}$ fathoms respectively, with deep water between them, situated from 5 to 7 miles south-westward of Kiminatin; these shoals are the outer dangers of the Cuyos group in this direction.

Between the Filomena shoals and Kapnoyan, at the distance of 4 and 5 miles respectively from Kapnoyan, lie two other shoals, Pacheco and Ramon; the former with a least depth of 3 fathoms, and Ramon with a coral head of $1\frac{1}{2}$ fathoms.

WHITE ROCK, situated S. 1° W. $24\frac{1}{2}$ miles from Cuyo peak, is 24 feet high, and has a white head from bird-droppings; it is steep-to on its south and east sides, but a shoal with a depth of 6 fathoms extends off west-north-westward to a distance of one mile, then increasing suddenly to 56 fathoms.

Queen of the Sea bank, an 8-fathoms patch, was discovered in 1868 by Captain Smiley, of the ship *Queen of the Sea*. The bottom was distinctly seen and the bank appeared to be $1\frac{1}{2}$ to 2 miles in diameter. It is charted in a position from which Karandaga island bears N. 39° W., distant 21 miles, and Kiminatin island N. 45° E.

Rock.—A rock, on which the s.s. *Elax* struck in 1910, is situated about $2\frac{1}{2}$ miles south-eastward of Queen of the Sea bank, in lat. 10° 24' N., long. 120° 31' E.

SOMBRERO ROCK (*Lat. 10° 43' N., Long. 121° 33' E.*), situated about midway between the south-west end of Panay and Tagauayan, one of the Cuyos islands, is 10 feet high, not larger than a boat, and not visible beyond 8 or 9 miles; it generally shows black. When seen from the northward it first appears in two parts, of which the western one is the higher. From it Mount Aguada in Cuyo bears N. 78° W., distant $31\frac{1}{2}$ miles, and the east tangent of Tagauayan N. 52° W.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

KAGAYANES ISLANDS and REEFS.—The Kagayanes islands and reefs lying south-westward of Panay are, together with the adjacent Nicholson and Sultana banks, 31 miles in length north-north-east and south-south-west, and about 12 miles in extreme breadth; the islands lie at the southern extremity, on the point of an extensive reef, very steep-to, the depth of water at one cable distance from the reef being over 100 fathoms. The islands are fringed by a coral reef westward and southward, but are bold-to on the east side, where landing is practicable.

Kagayan (*Lat. 9° 35' N., Long. 121° 13' E.*), the largest island, 285 feet in height, is, including Boomboong, $6\frac{1}{2}$ miles in length in a north-east and opposite direction, and 2 miles in breadth; it is thickly wooded. On the southern side there is a village with a fort and church, but the reef which extends nearly a mile to the southward of the village is too steep to afford anchorage; nor is there any anchorage near the neighbouring islands Kagayançillo and Dondonay. Apparently there is a boat passage inside the reef from the village into the lagoon, and the *Samarang* in 1846 found a northern entrance to the lagoon which would admit vessels of 12 feet draught.

Supplies.—The *Samarang* obtained cattle, hogs, poultry, and cocoanuts at a reasonable price, but the island does not afford good water.

The reef extends 8 miles to the northward of Boomboong, and about the same distance to the north-east, including the small, sandy island of Anuling, 40 feet in height. The western and northern sides of this dangerous reef have rocky heads showing above water, which mark it in the day-time.

Manukan islet, on a detached reef north-eastward of Dondonay, has cocoanut trees on it. The *Flying Fish* anchored on the tail of the reef that stretches westward from the north end of the islet in a depth of 7 fathoms, coral, with her stern in deep water.

Nicholson banks.—The southern end of these banks is about 3 miles north-eastward of Anuling; they extend northward about $7\frac{1}{2}$ miles with a breadth of 2 miles, and consist of several patches with depths of 3 to 7 fathoms, between which there is deep water.

Sultana bank.—The southern end of this bank, which is separated from Nicholson banks by a passage $2\frac{1}{2}$ miles in width, in which the depths are 18 to 24 fathoms, is $11\frac{1}{2}$ miles N. 9° E. of Anuling island, and extends northward $6\frac{1}{2}$ miles; the northern end being in lat. 10° 1' N. and long 121° 23' E. The width of the bank is about one mile, the ridge having patches of $2\frac{1}{2}$ and 3 fathoms with deep water between.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Both Sultana and Nicholson banks are very steep-to on their western sides, with depths of 100 fathoms at the distance of less than half a mile, but they slope gradually eastward, where the 100-fathoms contour line is 6 miles from the shallow ridge of the former bank.

Kalusa, a small inhabited island, thickly covered with cocoanut trees, 60 feet high, lies N. 77° W. 10 miles from the south point of Kagayan island. It is fringed by a coral reef on the north and north-west, but is steep-to on the east side, where landing is practicable though difficult, in ships' boats, as there is but little depth over the reef. The passage between Kalusa and Kagayan appears to be deep and safe. A recent report states that Kalusa island is about 3 miles farther north-west than is shown on the charts.

KAVILLI and SANDY ISLANDS, with their outlying reefs, extend $8\frac{1}{2}$ miles in an east-north-easterly and opposite direction, with a deep channel $1\frac{1}{2}$ miles wide between them; they lie about 30 miles south-west of Kagayan.

Kavilli or Kaueli island (*Lat. 9° 14' N., Long. 120° 52' E.*), the north-eastern of the two coral islands, 124 feet in height and covered with trees, is about three-quarters of a mile in length; it is surrounded by a reef which extends $2\frac{1}{2}$ miles in an east-north-east and opposite direction.

Sandy island.—The south-western island is low, and stands on a reef $4\frac{1}{2}$ miles in length, with detached sand cays to the southward and westward of it. There are trees on the island.

As these islands are steep-to on all sides, and the lead gives no warning, mariners should be cautious when navigating in their vicinity, especially at night.

Charts 967, 2578.

TUB BATAHA.—This dangerous line of reefs, in two parts, consists of small islets, sand cays, and large boulders, all connected by sand ridges about 2 feet above high water, and fringed with steep-to coral reefs, running north-east and south-west for a distance of about 16 miles.

The north-east islet, which is the highest, is about 20 feet above the sea, with verdure in the centre, and lies in lat. $8^{\circ} 53\frac{3}{4}'$ N. and long. $120^{\circ} 0\frac{3}{4}'$ E.

The south-western islet is about 15 feet above the sea, with the trunk of a large embedded tree on its north-east side; Black rock lies $1\frac{1}{2}$ miles northward of it. Apparently a channel exists through the reef about 5 miles north of the south-west islet, but it has not been examined. Both of these islets teem with sea birds, which fly a long distance from the reef. As a complete examination of the Tub Bataha

General charts 943, 2660b, 1263.

Charts 967, 2578. Var. 1° 30' E.

reef has not yet been made, the seaman when navigating in this vicinity cannot be too cautious, the lead giving little or no warning.

Temerario rock is shown on the chart as lying about $7\frac{1}{2}$ miles S. 41° E. from the north-east islet of Tub Bataha, and a reef is shown 9 miles S. 13° W. from the same point. These positions have not been examined.

Breakers reported.—The master of the British s.s. *Cape Antibes* reported in 1907 having passed in the Sulu sea a patch of breaking water in approximately lat. $8^{\circ} 28'$ N., long. $120^{\circ} 20'$ E., or S. 39° E., 32 miles from the north-eastern islet of Tub Bataha.

No soundings appear to have been taken in the vicinity, and it might have been a shoal of fish.

Jessie Beazley reef (Lat. $9^{\circ} 2'$ N., Long. $119^{\circ} 49'$ E.), 13 miles N. 54° W. from the northern islet of Tub Bataha, is about 6 cables in length, and is awash at low water springs for the whole of its length; there are a few scattered heads of coral on it, the highest of which, a small pyramidal-shaped rock about 4 feet high, lies at its eastern extreme.

The original position assigned to this reef in 1865 by the master of the *Jessie Beazley* has not been examined, and is still retained on the chart, awaiting further information; it is shown in lat. $9^{\circ} 6'$ N., long. $120^{\circ} 4'$ E.

Chart 967, Paláwan island.

Nicholson reef was placed on the Admiralty charts in 1865-1867 as in lat. $8^{\circ} 51'$ N., long. $119^{\circ} 43'$ E. This position was crossed over by the *Rambler* in 1889 without any sign of shoal water being observed, and no bottom at 1,079 fathoms was obtained close to it. It may, therefore, be assumed that this danger does not exist in that position, but for the present it is retained on the Admiralty charts in lat. $8^{\circ} 51'$ N., long. $119^{\circ} 39'$ E. (position doubtful).

Quesada or South Tub Bataha.—This reef was supposed to exist in lat. $8^{\circ} 4'$ N., long. $119^{\circ} 50'$ E.; H.M.S. *Nassau* tried for soundings there, finding no bottom with 180 fathoms. Six miles W. by N. of this position bottom was obtained in 1,878 fathoms, pale yellow sand. As it was a clear day, and a good look-out was kept from the masthead, there is no doubt this shoal has been misplaced on the charts, or probably does not exist.

In 1902 the rocks and shoal shown on chart 967 in lat. $7^{\circ} 58'$ N., long. $119^{\circ} 47'$ E., were searched for unsuccessfully by U.S.S. *Quiros*.

Mæander reef, discovered by H.M.S. *Mæander* in 1849, is a sand cay, about 180 yards in extent, and 6 feet high, with a large

General charts 943, 2660b, 1263.

Chart 967, Palawan island. Var. 1° 40' E.

stump of driftwood on it. The cay is frequented by large numbers of sea birds, and is surrounded by a fringing reef steep-to on all sides.

Bankoran island (*Lat. 7° 57' N., Long. 118° 41' E.*), about half a mile in extent, is flat and overgrown with trees, the tops of which are 140 feet above the sea. It is steep-to south-eastward, but a reef extends from the island about half a mile northward, and $1\frac{1}{4}$ miles to the north-west. These reefs are steep-to.

Bankoran island is a good landmark to make when crossing the Sulu sea from Sulu or Samboanga to Clarendon bay, Balábac island, or from Puerto Princesa to Kagayan Sulu or Sandakan.

Moyune shoal.—The master of the s.s. *Moyune*, 1897, reported that his vessel struck on a rock with 26 feet water, situated approximately in lat. 8° 6' N., long. 118° 6½' E. Not seen, November, 1901, by U.S.S. *General Alava*, which vessel passed $1\frac{1}{4}$ miles from this position.

Java reef.—This dangerous reef, about $1\frac{1}{2}$ miles in diameter within the 5-fathoms limit, with a depth of $2\frac{1}{2}$ fathoms upon it, lies S.W. by S., about 8 miles from Bankoran island. It is marked by discoloured water, and there are strong tide rippings round the shoal ground.

Clearing mark.—A good clearing mark, if working on its parallel to the northward and eastward, is not to open the small islet north of Bankawan, 5 miles south-south-westward, to the westward of that island.

Valparaiso shoal is stated to be about 2 miles in extent, with apparently shoaler water south-westward. The s.s. *Shantung*, drawing 19 feet, touched on or in the vicinity of this shoal, the depth on which is assumed to be about 3 fathoms. The coral bottom has been clearly seen at a depth of 6 fathoms. It lies about 14 miles W.S.W. of Bankoran island in lat. 7° 52' N., long. 118° 33' E., approximately.

ST. MICHAEL ISLANDS consist of four islets, situated about 40 miles northward of Kagayan Sulu.

Bankawan (*Lat. 7° 45' N., Long. 118° 33' E.*), the largest of the group, is three-quarters of a mile in length, and rises to a peak 123 feet high at the north-east end, which is nearly separated from the rest of the islet.

A reef extends nearly $1\frac{1}{2}$ miles northward from Bankawan, upon which there is a small coral islet, also sand cays and large boulders. Bankawan is steep-to south-eastward.

Manuk Manukan is the larger of the other two islets of this group, which stand upon a reef $1\frac{1}{2}$ miles in length lying about 5 miles

General charts 2660b, 1263.

Chart 967, Palawan island. Var. 1° 40' E.

S. 65° W. from Bankawan; it is thinly covered with trees, the tops of which are 32 feet above the sea.

The remaining small coral islet, 20 feet in height, lies half a mile southward of Manuk Manukan; there are large lumps of coral on the reef which show at low water.

Shoal ground extends north-westward from Manuk Manukan reef, and there is a patch of $2\frac{1}{2}$ fathoms at the distance of $2\frac{1}{2}$ miles from the islet. Shoal water also extends half a mile southward of the reef. There is no safe anchorage round any of these islands.

West bank, with depths not exceeding 10 fathoms, lying 4 miles westward of Manuk Manukan, is $3\frac{3}{4}$ miles in length north-north-west and south-south-east; the least depth found upon it, 6 fathoms, is near the south end.

South-west bank is an extensive bank situated with its north-eastern end about 5 miles S. 36° W. of Manuk Manukan, whence it extends westward $3\frac{1}{4}$ miles and thence north-west 5 miles; the least depth, 9 fathoms, was found at its south-east extreme. The depths are fairly regular, 9 to 15 fathoms, coral and sand; the bottom can be clearly seen. Anchorage with good holding ground may be had on this bank. From the eastern edge of the bank the summit of Kagayan Sulu can be seen in clear weather, bearing S. 13° E., distant 38 miles.

Dangers.—A small shoal with a probable depth of 2 or 3 fathoms of water exists in lat. 7° 36' N., long. 118° 8' E. Another similar shoal is situated in lat. 7° 39' N., long. 118° 11' E. These two shoals lie west-south-westward of South-west bank, and are 4 miles apart north-east and south-west.

A shoal about one mile in diameter covered with large boulders, some of which appear to be nearly awash, is situated in lat. 7° 34' N., long. 118° 22' E. A sounding of 4 fathoms has been obtained on this shoal, and of 7 fathoms near its edge, which is steep-to. It lies about $3\frac{1}{4}$ miles southward of the eastern part of South-west bank.

Memnon shoal (with its centre in *Lat. 7° 28' N., Long. 118° 25' E.*) is situated nearly in the middle of the channel between St. Michael islands and the shoals northward of Kinapusan island, and is $16\frac{1}{2}$ miles northward of that island; it rises suddenly from very deep water, and is, within the 100-fathoms contour line, about 3 miles in length east and west, $1\frac{1}{4}$ miles in width, with a least depth of 8 fathoms, the bottom being live coral with patches of sand.

H.M.S. *Egeria*, 1891, found that heavy tide rips marked the north-eastern edge of the shoal, which otherwise did not show.

Current.—While the *Egeria* was at anchor on the bank, during spring tides, the current set between S.S.W. and N.N.W. with a maximum rate of 1·2 knots per hour, the flood setting north-westward.

General charts 2660b, 1263.

Plan 929, Kagayan Sulu. Var. 1° 40' E.

The KAGAYAN SULU GROUP, in the south-western part of the Sulu sea, belongs to the United States of America, and includes the island of Kagayan Sulu, and the two Muligi islands south-westward of it, with Kinapusan, Pomelikan, Bintut, Bohan, Mandan, and some rocks to the north. Kagayan Sulu is the only island inhabited, the others being resorted to but for temporary purposes, such as turtle catching.

Kagayan Sulu (*Lat. 7° 1' N., Long. 118° 27' E.*), the largest of the group, about 8 miles in length east and west and 5 miles in width, is (with the exception of the north-west and south-east points, which are steep-to) fringed by a coral reef extending in some places nearly three-quarters of a mile from the shore; this reef dries in patches at low water, leaving channels for canoes between the dry parts of the reef and the coast of the island.

In the interior of the island there are ranges of hills, attaining a height of 1,105 feet on the east side, and sloping gradually to the sea. *See view on plan 929.*

Kagayan Sulu is thinly populated; the soil and climate are suitable for the cultivation of tobacco, sugar-cane, hemp-palm, yams, bananas, and a variety of fruits and vegetables, but the natives are indolent, and depend chiefly for their subsistence on fish and rice imported from Paláwan and Borneo, for which they exchange cocoanuts, coconut oil, and mats.

Jurata, on the south coast of the island, on the eastern side of the entrance to Lake Hiwata, was closed as a port of entry in 1908, but is visited regularly by the inter-island steam vessels.

Supplies.—There are small horses and bullocks on the island; the latter with a few fowls constitute the only live stock, for which exorbitant prices are demanded.

Water may be obtained at half tide from a spring at the landing place near the south-west anchorage, and also at the watering place inside Hiwata lake on the south side of the island.

Anchorage.—The best anchorage during the north-east monsoon is at the South-west anchorage on the west side of the island, in a depth of from 9 to 11 fathoms, sand and coral; with Tanjong Tavo Tavo bearing N. 8° W., distant about 1½ miles, and a remarkable tree on the south-west point bearing S. 64° E. about the same distance. Nearer Tanjong Tavo Tavo, and in-shore of the above position, the bottom is very uneven, with patches of 3 to 5 fathoms only.

During this monsoon a swell sets in occasionally round Tanjong Tavo Tavo, causing an unpleasant rolling motion, and interrupting the communication with the shore, the sea breaking along the entire edge of the reef.

General charts 287, 967, 2576, 2660b, 1263.

Plan 929, Kagayan Sulu. Var. 1° 40' E.

There is anchorage on the south side of the island off the middle remarkable crater basin, in a depth of 10 fathoms, sand, with Tanjong Tando-tao, the south-east point, bearing N. 83° E., and the islet at the entrance of the western crater, N. 37° W., distant about one mile.

The best anchorage on the north side is in a depth of 18 fathoms, with Lapun Lapun island bearing N.E. by E. and Ton Kanutyajan point S. by W.

Tides.—At Kagayan Sulu, during the north-east monsoon, it is high water, full and change, at 6h. 10m.; springs rise 6 feet, approximate. The tides are irregular and uncertain, the tidal stream being scarcely perceptible.

Kinapusan (*Lat. 7° 11' N., Long. 118° 26' E.*), about two-thirds of a mile in length east and west, and 311 feet in height, is the northernmost of the Kagayan Sulu group; it is surrounded by a coral reef, which on the south side extends about 3 cables from the shore.

To the north and east of the island the water is deep, but on the south and west sides the 20-fathoms contour line of soundings is distant $1\frac{1}{4}$ miles from the shore.

Fair anchorage will be found on the bank off the south-west side of the island, about 8 cables from the shore, in depths of from 7 to 10 fathoms, coral and sand, with Kinapusan summit bearing N. 39° E. and Pomelikan summit S. 29° E.

North-east bank, the 10-fathoms limit of which includes a circular space of about one mile in diameter, and with only 4 fathoms near the middle of it on the shoalest part, lies with its centre N.E. by E., distant about 3 miles from Kinapusan; the shoal is of coral and sand, with deep water between it and the island.

This bank is not steep-to, as the depths decrease regularly from 20 fathoms to 5 fathoms, forming a fair anchorage or stopping place on either edge of the shoal.

Clearing mark.—Tanjong Tavo Tavo in line with the west point of Bohan S. 21° W. leads eastward of the bank, and Pomelikan kept just open westward of Tanjong Tavo Tavo leads westward of it.

North-west bank, the southern 4-fathoms patch of which is N.W. $\frac{1}{2}$ W., $3\frac{1}{4}$ miles from Kinapusan, runs thence in a north-west direction one mile, and is about one-third of a mile in width; it is of the same character as the North-east bank, but is more steep-to, and vessels should not anchor on it.

Clearing marks.—The west point of Bohan in line with west point of Pomelikan S. 22° E. leads eastward of North-west bank; and the west point of Pomelikan in line with the west end of Mandan bearing S. 37° E. leads westward of it.

General charts 287, 967, 2576, 2660b, 1263.

Plan 929, Kagayan Sulu. Var. 1° 40' E.

Pomelikan (*Lat. 7° 8' N., Long. 118° 27' E.*), a small island, 180 feet in height, standing in the centre of a reef about three-quarters of a mile in length north-east and south-west, lies $2\frac{3}{4}$ miles southward of Kinapusan. Near the eastern edge of the reef is a large rock.

There are good channels on either side of Pomelikan, but the reefs projecting 3 cables from the south sides of Kinapusan and Pomelikan must be avoided.

About $1\frac{1}{2}$ miles south of Pomelikan are the two small islets Bintut and Bisu Bintut, which are steep-to; Bintut appears to be formed of dark sandstone. Bisu Bintut is a rock on the eastern side of Bintut.

Bohan and Mandan, situated about midway between Pomelikan and the north shore of Kagayan Sulu, and $2\frac{1}{2}$ miles distant from the latter, are connected by a reef dry at low water, and together extend nearly $2\frac{1}{4}$ miles east and west; Mandan, 283 feet in height, is at the eastern end, and the small islet Bisu Bohan, 66 feet in height, on the western point of the reef projecting from Bohan.

There is a good channel, three-quarters of a mile wide, between Bisu Bohan and Bisu Bintut; also between Mandan and Lapun Lapun, a small islet 136 feet in height, almost connected by a reef with the shore of Kagayan Sulu.

All these islands, with the exception of Bintut, are thickly wooded.

Muligi islands (*Lat. 6° 53' N., Long. 118° 25' E.*).—These two islands are, respectively, 410 and 232 feet in height, the southern and larger island being about half a mile in length north and south, and one-third of a mile in breadth; they lie about $8\frac{1}{2}$ miles southward of Tanjong Tavo Tavo, with a clear channel 5 miles in width between them and Kagayan Sulu.

These islands are uninhabited, but the natives resort to them to fish.

A reef is said to extend 2 cables north-eastward from the south Muligi island; the channel between the islands, though clear, should not be attempted. For shoals south-westward of Muligi island, *see* page 156.

Willcox bank.—H.M.S. *Growler*, 1877, passed over a coral shoal situated N. 60° E., 4 miles from the north Muligi island, with Tanjong Tavo Tavo bearing N. 31° W.; the least depth obtained was $6\frac{3}{4}$ fathoms, the bottom being distinctly visible. The shoal is steep-to.

Chart 2576, Sulu archipelago.

Coral shoal.—A coral patch of 3 fathoms has been reported by a German steam vessel as lying 31 miles south-eastward of Kagayan Sulu, in lat. 6° 39' N., long. 118° 57 $\frac{1}{2}$ ' E.

General charts 287, 967, 2576, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 10' E.

PALÁWAN ISLAND.—**General remarks.**—The island of Paláwan or Paragua, one of the largest islands of the Philippine archipelago, being sixth in point of size, extends north-east and south-west, between the parallels of 8° 21' N. and 11° 25' N., and is the most western of those islands. It is high, long, and narrow, and forms with its eastern coast the western boundary of the Sulu sea. It has an area of about 4,027 square statute miles, and a length of general shore-line of about 674 nautical miles. The island is sparsely inhabited, and its interior is little known. According to the last census Paláwan has a population of 10,918, of whom 5,412 are classed as civilised and 5,506 as wild.

The island produces wax, nutmegs, camphor, sandal-wood, cocoanuts, canes, and the edible birds' nests, also a variety of timber for building purposes.

The published chart of this island is on too small a scale to navigate with safety, and the coast, therefore, should be given a wide berth. The remarks are chiefly from the survey by Captain Bate in H.M.S. *Royalist*, 1850-54.

Only the eastern coast of the island is described in this work.

EAST COAST OF PALÁWAN ISLAND.

General remarks.—In giving sailing directions, and a description of the east coast of Paláwan, it is to be borne in mind that, although they may be found sufficiently succinct and accurate to meet the ordinary requirements of navigators, they are, nevertheless, but the result of a few observations hurriedly collected in a run down the coast during the summer, and a beat up in the winter months of 1850, by Captain Bate, H.M. Surveying vessel *Royalist*, taken with a view to ascertain the practicability of adopting this route to China, in preference to the usual passage on the west side of Paláwan, when late in the monsoon. They are not, therefore, implicitly to be relied upon, as resulting from a well-executed survey; nor are they intended in any way to lessen the necessity of keeping that vigilant look-out which the navigation of coral seas, on all occasions, urgently demands.

The adoption of the Paláwan passage, in preference to the route on the east side of the island, is recommended as the result of Captain Bate's experience.

In the strength of the north-east monsoon, sailing vessels may, when taking the latter route, reach as far as the parallel of lat. 10° N., or to the island of Dumaran, without very great difficulty; but to get beyond this they will experience at least considerable delay, even if they succeed at all, for the current in this season sets strong to the southward between Paláwan and the Cuyos islands, the

General charts 943, 2660b, 2661b, 1263.

Charts 967, 2577. Var. 1° 10' E.

velocity being almost in direct proportion to the strength of the wind. H.M.S. *Royalist*, in the month of December, was delayed 15 days, vainly endeavouring to get round Dumaran against the monsoon, and had, after all, to make the passage into the China sea via Panay and Mindoro.

Tides.—The flood stream sets along the shore to the southward, and the ebb to the northward. The maximum velocity observed was $1\frac{1}{2}$ knots, and the rise 7 feet. The currents on the east coast depend chiefly on the prevailing winds. See preceding remarks.

Kabuli island (*Lat. 11° 26' N., Long. 119° 29' E.*) lies 3 cables off the north end of Paláwan, with depths of 7 to 9 fathoms between. The island is $1\frac{1}{2}$ miles in length, 560 feet in height, and has rather a flat summit; the northern extremity terminates in a small head, with 17 fathoms water almost close-to. It is bold to approach on all sides, the depths being about 20 fathoms.

The northern end of Paláwan is the extremity of a promontory $3\frac{1}{2}$ miles in length by $1\frac{1}{2}$ miles in breadth. Near the northern end is a hill 493 feet high, with some flat land of greater elevation to the southward.

Darokotan bay, situated between the north point of Paláwan and Darokotan point, is 5 miles wide. Reefs awash and steep-to extend three-quarters of a mile northward from Darokotan point, which has also some rocks off it.

In the northern part of the bay, about one mile south-east of the opening between Kabuli and Paláwan, are the North and South Brother islets. The depth close eastward of them is 25 fathoms, and in the direction of Darokotan island, 12 fathoms, mud.

Darokotan island occupies a central position in this bay, about a mile from the shore, and has on its south side some reefs which stretch nearly two-thirds of the way towards Darokotan point.

Coast.—From Darokotan point the coast trends southerly for $11\frac{1}{2}$ miles to Shark's Fin bay, and is faced by numerous islets and reefs, and fringed by a reef extending in places to more than one mile. A rock awash at low water lies on the outer edge of the bank extending from shore abreast of Sta. Monica, at a distance of $7\frac{1}{2}$ miles S. 29° W. from the summit of Hastings island.

The settlement of Sta. Monica, about 3 miles southward of Darokotan point, is situated in a small bay abreast Ilok island and under East peak, the stockade being built on a small projecting head, with a few houses at the back amongst cocoanut trees. The population is said to be about 100. East peak, 1,890 feet high, is conspicuous from the northward and eastward. The village of Sabaltan is reported to lie $1\frac{3}{4}$ miles southward of the charted position of Sta. Monica.

General charts 943, 2660b, 2661b, 1263.

Charts 967, 2577.

High Table range.—South-westward of Sta. Monica is High Table range, running from north to south and attaining its greatest elevation, 2,230 feet, in a high table-top, in lat. $11^{\circ} 14' N.$ About 5 miles farther southward is Sharp peak, 1,630 feet high, westward of Knob and Triple island.

North and South rocks, above water and $2\frac{1}{2}$ miles apart, lie off this part of the coast, the latter being 2 miles from the shore, and nearly $2\frac{1}{2}$ miles north of Knob and Triple island; in a direct line between these rocks are two patches of 3 fathoms, coral, steep-to to seaward.

Ilok or Austin island, lying $6\frac{1}{2}$ miles east-south-eastward of Darokotan point, is 4 miles in extent, and has, off its north-east extreme, a smaller island, named Balungungan, with a rock above water in the middle of the channel separating them. The western side of Ilok island appears bold to approach; it has, however, been but partially sounded. The south-west coast is fringed by an extensive reef, dry at low water. The village of Pinamalayan is situated near the south end of Ilok island. Dado islet lies about $2\frac{1}{2}$ miles eastward of its northern end; a patch of $6\frac{1}{2}$ fathoms lies $2\frac{1}{2}$ miles south-eastward of Dado. View c, at page 58.

Binulbulan or Cleopatra island (*Lat. $11^{\circ} 15' N.$, Long. $119^{\circ} 37' E.$*) lies $2\frac{1}{2}$ miles south-west of Ilok island, and 3 miles from the shore. It is 2 miles in extent, has an undulating summit, and some rocks above water off the north point. A coral spit projects 4 cables eastward from the south point of the island, to the southward of which, at half a mile and at one mile from it, are two rocks above water. View c, at page 58.

Bagambangan, or Smith island, $1\frac{1}{2}$ miles south-eastward of Ilok island, is $2\frac{1}{2}$ miles in extent, having at the south point a rocky lump, 60 feet high, three-quarters of a mile south-east of which is a rocky islet, with shoal water half a mile south-eastward of it.

There is a small island, with a long sandy tongue on its south-east side, lying westward of Bagambangan island, and between the latter and Ilok island is a sandbank surrounded by a reef.

Knob and Triple or Batas island is at the northern entrance of Shark's Fin bay; it is 5 miles in extent, has two remarkable peaks, and is connected with the shore at low water by islets and reefs.

Five islets are charted from 2 to 4 miles eastward and north-eastward of Knob and Triple island.

Chart 967, Paláwan island. Var. $1^{\circ} 20' E.$

Shark's Fin bay lies between Knob and Triple and Maitiaguit islands, and is $2\frac{1}{2}$ miles wide at the entrance.

General charts 943, 2660b, 2661b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Reefs stretch nearly half-way from the northern shore across the entrance of the bay, which, together with the spit extending from the north extreme of Maitiaguit island, contract the entrance channel to 8 cables. The depths inside the reef are 11 to 18 fathoms. There is an islet one mile from the shore on the west side, and two others in the southern head of the bay.

Maitiaguit island is of irregular shape, about 7 miles in length north-north-west and south-south-east, and faces the coast between Shark's Fin bay and Taitai bay.

Danger.—Some islets lying on the north side of Maitiaguit island have also reefs off them; N.E. $\frac{1}{4}$ N. $1\frac{1}{2}$ miles from the easternmost of these, and S. $\frac{1}{2}$ E. $1\frac{1}{4}$ miles from the islet situated S.E. by S. $2\frac{1}{4}$ miles from Knob and Triple eastern peak, is a coral patch. The western extreme of Binulbulan open eastward of the eastern extreme of Knob and Triple island leads eastward of it.

Off-lying islands.—A group of four large and several smaller islands lie about 5 miles eastward of Maitiaguit island.

Gimenez island or Malabuktun (*Lat. 11° 7' N., Long. 119° 40' E.*), the largest of the group, $6\frac{1}{2}$ miles in circumference, lies about 3 miles north-eastward of Maitiaguit, and from it several islets extend in a northerly direction towards Knob and Triple, and Smith islands.

Mombanen or Montero island lies 2 miles eastward of Maitiaguit, and is about $2\frac{1}{2}$ miles long north and south, and nearly a mile broad.

Dome island or Pinachiuyan, lying eastward of Mombanen, rises to a height of 1,020 feet. It is separated from Mombanen by a channel from 2 to 4 cables wide, and is connected with Collinson island or Kaisian by a reef. The town of Kaisian is situated on the south side of Dome island.

Collinson or Kaisian island, the south-eastern and smallest of the four principal islands, is $3\frac{1}{2}$ miles in circumference, moderately high, and wooded.

Signal or Verde island, about half a mile in length, lies one mile S. by W. from the south-west extreme of Dome island, with a 2-fathoms shoal of some extent in the passage between; a reef is charted as extending half a mile southward from Signal island.

Other islets and high rocks also lie about this group; the easternmost of these, Broken island, $3\frac{1}{2}$ miles eastward of Gimenez island, is cleft to its base at the north-east end; there is a small rock above water at a cable off the south-east face. The other islets are Frances and Latitude islets and some unnamed rocks.

Dangers.—At $2\frac{1}{2}$ miles S. 76° E. from the northern extreme of Dome island, and about $1\frac{1}{4}$ miles off-shore, is a rock awash.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

A sunken rock is charted one mile west of the northern extreme of Mobanen island, and another midway between the southern ends of Signal and Collinson islands.

There are also rocks awash, and others above water, midway between Frances and Gimenez islands; and many of the points of the large islands have reefs and rocks projecting from them.

Directions.—It is recommended not to take the passages between the islands forming this group, as they have not been thoroughly surveyed. The safest channel is inside of them all (where good shelter from the prevailing wind may be had), entering from the northward, passing east of Knob and Triple island where the channel is one mile wide between it and Boswell island, thence passing southward between Maitiaguit and Latitude islet, off the south end of Mobanen, where the channel is also about one mile wide. Care must be taken to avoid the coral patch north-eastward of Maitiaguit island, mentioned on page 82, and the sunken rock westward of the north point of Mobanen.

The depths throughout this channel vary from 20 to 30 fathoms mud. Caution is requisite not to approach too near the north-east extremity of Castle peak peninsula, the south-east portion of Maitiaguit island, as some rocky ground extends $1\frac{1}{2}$ miles in that direction from it.

The Silanga islands, three in number, lie off the entrance of Silanga bay, each being surrounded by a reef barely a cable in extent; but 3 cables south-east of the centre island there is a shallow patch.

The depths in the neighbourhood of these islands are from 17 to 20 fathoms; between them and Iguano island there are 23 fathoms, and between the latter and Lion rock 25 fathoms.

Silanga bay (*Lat. 11° 1' N., Long. 119° 35' E.*), formed by the south-west side of Maitiaguit island and the coast abreast, is 2 miles wide and nearly the same in length; Silanga settlement, comprising a stockade and a few houses built upon a small isthmus head, is situated on the north-west side, immediately under Silanga peak, which is 1,700 feet in height.

There is a boat passage at high water, about 2 miles in length, leading to Shark's Fin bay.

Shelter from north-east winds may be had in Silanga bay in depths of 12 to 15 fathoms, taking care not to approach either side closely, as the shore on which the settlement is situated is fronted by coral reef to about half a mile off, and the eastern side is shown as foul to a greater distance.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Old Castle or Negra point, the east extreme of Silanga bay, is the south extremity of Castle peak peninsula, the southern portion of Maitiaguit island; it is of limestone formation, and conspicuous.

Vessels proceeding into Silanga bay should haul close round Nabat islet or Lion rock, a high islet off Old Castle point (a steam vessel may pass inside it), in order to avoid Royalist reef, mentioned on page 85, and enter northward of Silanga islands, keeping a good look-out for discoloured water.

TAITAI BAY is about 9 miles wide, between its extreme points, and 6 miles deep, affording good shelter in the south-west monsoon; the distance across Paláwan island here in some parts does not exceed 4 miles.

A high range overlooks the shore, and in that portion which separates the north-west part of Taitai bay from Bakit bay, is Sharp Shoulder, 1,680 feet in height, and some sharp peaks on it, giving rise to the appellation of Shark's Fin range.

Four islands lie across the entrance of Taitai bay; Iguano, Elephant, and Castle, the three northern islands, as well as Lion rock, previously mentioned, are high precipitous rocks, of limestone formation, clothed with foliage.

Taitai bay has been only partially sounded. The western shore is fronted by coral, which in some places extends 2 miles off, with depths of from 10 to 17 fathoms close to the edge.

Taitai fort is in the south-west angle of the bay; the walls of the fort are 30 feet high. The mud and rocks dry some distance off the fort at low water; and there are several detached coral patches, lying upwards of a mile from the shore, with depths of 9 to 12 fathoms close-to.

At 2 miles northward of the fort is Taitai head, and $3\frac{1}{4}$ miles beyond is Bush island, just detached from the shore, with a boat channel between. An islet with a reef awash northward of it lies $1\frac{1}{2}$ miles off a little southward of this, and another islet lies half a mile outside Bush island.

Polarikan (*Lat. 10° 58' N., Long. 119° 28' E.*).—There is an islet on the north side of a small opening in the reef, 8 miles northward of Taitai, which opening leads to a rivulet of fresh water, and where, on a hill overlooking it, is Polarikan settlement, prettily situated amongst some cocoanut trees.

In the north-west part of the bay, $3\frac{1}{2}$ miles from Polarikan, there are some openings in the mangrove, whence the shore in irregular outline trends eastward to Silanga.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Large tracts of land in the interior are under cultivation; and a foot-path, or bridle-road, communicates with Malampaya inner sound, on the opposite side of the island.

Anchorage.—Vessels bound to Taitai bay should use extreme caution, as there are other shoals than those shown on the chart, and anchor in 19 fathoms, with Taitai fort bearing S. 39° W., distant 2½ miles.

Supplies.—The usual supplies, such as pigs, goats, fowls, vegetables, &c., were to be obtained in moderate quantities.

Water is not plentiful, that is, such as can with facility be procured by ships' boats.

Tides.—It is high water, full and change, in Taitai bay at about 9h. 30m.; springs rise 5½ feet.

Islands and dangers.—**S. Passage island or Binatikan** (*Lat. 10° 57' N., Long. 119° 42' E.*), 1½ miles in length north and south, lies in the offing of Taitai bay, 5 miles south-eastward of the south point of Maitiaguit island; it is moderately high and wooded.

A rocky shoal with 2½ fathoms over it lies N. 70° E. 2 miles from the north point of Binatikan; a coral shoal, with a depth of 1½ fathoms over it, lies 2 miles N. 70° W. from the same point, and another with less than 6 feet lies a short distance farther in the same direction.

Iguano or Apulit, the northernmost island in the bay, lies 2 miles south-westward from the southern point of Maitiaguit island; the passage between it and Elephant island to the southward, 2½ miles wide, with 26 fathoms water, is the best to enter the bay. From the south point of Iguano a reef extends 2 cables; on the south-eastern side of the island a reef projects half a mile.

There is also a reef with 3 feet of water on it, on which the *Royalist* struck, 1½ miles eastward of Iguano. It will be avoided by keeping the east extreme of Maitiaguit island to the westward of North, until the south point of Iguano bears West. There is a 5-fathoms patch half a mile north-eastward of the reef.

A 4-fathoms bank, half a mile in extent, with probably less water on it and steep-to, lies S.W. 1¼ miles from the south point of Iguano island, with a shallow rocky head about a mile westward of it.

Pabellones islands are two rocky islands about 750 feet high, about a quarter of a mile apart and connected by a reef. Elephant island, the northern of the two, is 2½ miles southward of Iguano or Apulit island, and has a reef awash at three-quarters of a mile to the eastward. Castle island, the southern, resembles a ruined castle.

Snake rock or Malatpuso, about 60 feet high, lies to the eastward, distant about 3½ miles from the Pabellones islands.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Two-fathoms shoal.—There is a bank, with 2 fathoms, coral, about a mile in extent, lying with Snake rock S. 44° E., distant 1½ miles from its shoalest part.

Three-fathoms shoal.—A shoal of coral and sand, with a depth of 3 fathoms over it, about 2 miles in extent, lies with its centre bearing N. 65° E., distant 5 miles from Snake rock.

North Taitai island (*Lat. 10° 52' N., Long. 119° 38' E.*), or Kalabadian, is the southernmost island facing Taitai bay; it lies 8 cables south-south-east from Castle island, with which its formation contrasts strongly.

Dumbell, lying 4 miles westward from Iguano island, and about 1½ miles off-shore, is a remarkable double-headed island with a rocky islet a cable off its south-east point. Several dangers lie between it and Iguano, one with 1½ fathoms on it bears S. 75° E. 2 miles from Dumbell, and a coral patch with 1½ fathoms lies N. 23° W. nearly a mile from Dumbell island. At 2 miles eastward and 1½ miles south-eastward from Dumbell island are small islets fringed with reefs.

Coast.—From Santa Cruz point, the southern entrance point of Taitai bay, the coast trends south and east for about 11 miles to Dampier point, and is very irregular, being cut into by deep bays faced with islets and reefs; abreast the inlet southward of Santa Cruz point, the reef extends 1½ miles from the shore, with a depth of 19 fathoms near the edge. One of these bays westward of Point peak, 960 feet high, situated about 2½ miles north-westward of Dampier point, is 3½ miles deep, with a village at the head of it. There are two islets at the entrance, the largest of which, Shadwell, is 1½ miles from the shore. There are also three other islets farther up the bay, with 5 fathoms near them.

Dangers.—Two reefs, one with a sand cay on it, front the southern shore of the inlet, and rocks above water lie off the points under the peak at the entrance.

A rocky patch, with a depth of one fathom and deep water around, lies S.E. about one mile from Shadwell island, and sunken rocks lie north-east and south-west of the smaller island in the entrance of the bay.

South Taitai island or Ikadambanuan (*Lat. 10° 50' N., Long. 119° 38' E.*) lies eastward of the south entrance point of Taitai bay, from which it is separated by a channel barely a mile wide, with a depth of 18 fathoms. The island is 610 feet in height.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Dangers.—Black rock, awash, lies rather more than three-quarters of a mile from its east side; and at the south-east extreme of the island is a spit, with an islet and White rock near it.

A small reef, with a depth of less than 2 fathoms over it, exists between South Taitai island and the mainland.

A sunken rock lies $1\frac{3}{4}$ miles S. 16° W. from the southern extreme of South Taitai island.

Midway between South Taitai island and Pali island is a bank over a mile in length, east and west, with depths of 3 to 4 fathoms, coral; its western edge lies N. 50° W. $1\frac{1}{4}$ miles from Starfield, an islet in the middle of the channel, 2 miles north-east of Shadwell island.

A shoal of large extent with a depth of 2 fathoms over it is situated $2\frac{1}{2}$ miles N. 17° W. from the north point of Pali island.

Dangerous ground.—A patch of $2\frac{1}{2}$ fathoms is charted $12\frac{1}{2}$ miles eastward of the south extreme of S. Taitai island; a similar patch was reported in 1898, at $1\frac{1}{2}$ miles south-west of this position; they are probably identical.

A shoal, with a depth of about 3 to 4 fathoms, is reported to lie about 4 miles east of the north extreme of South Taitai. This neighbourhood being unsurveyed, requires special care when navigating, a good look-out aloft being essential.

Pali or Barren island (*Lat. $10^\circ 43'$ N., Long. $119^\circ 41'$ E.*), lying north-eastward of Dampier point, and separated from it by a channel 2 miles wide, with a depth of 23 fathoms, is a narrow island, $2\frac{3}{4}$ miles in length, north and south, and 720 feet in height. It is of a rocky barren aspect, with comparatively few trees growing upon it.

The depths around the island are from 23 to 25 fathoms; but for a short stay a vessel might anchor on a $6\frac{1}{2}$ -fathoms coral patch, three-quarters of a mile off, or on one with the same depth distant $2\frac{1}{2}$ miles; these are situated eastward of a small bay on the east side three-quarters of a mile from the south point of the island, where there is a depth of 11 fathoms at a cable from the beach.

Shoals.—A shoal with a depth of 6 feet over it is situated $4\frac{1}{2}$ miles N. 82° E. from the north point of Pali island; another similar shoal is situated about $1\frac{1}{2}$ miles further eastward.

There is a 3-fathoms patch, S. 2° E. 8 cables, and one with the same depth S. 80° E. $1\frac{1}{4}$ miles from the south extreme of Pali island, the two being in line with Dampier point bearing S. 60° W. A patch of 4 fathoms is charted N. 84° E., distant $3\frac{1}{2}$ miles from the south extreme of the island.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Water.—A stream in the small bay on the east side of Pali island, difficult to distinguish unless close to the beach, was the only eligible place discovered on this part of the coast for watering, which here is a tedious operation if not supplied with long hoses. Vessels should be prepared to quit the anchorage on the appearance of an easterly wind, as the swell, which usually precedes it, comes in suddenly.

Tides.—It is high water, full and change, at Pali or Barren island at 10h. 3m.; springs rise $5\frac{1}{4}$ feet.

Coast.—From Dampier point the coast trends south-eastward for 9 miles to Endeavour point (*Lat. 10° 32' N., Long. 119° 43' E.*), which is low, and densely wooded. It recedes about 2 miles westward, forming a bay which has been but partially sounded, and which doubtless contains other shoals than those already discovered. About 3 miles north-westward from Endeavour point there is an inlet, with Danlig village at its head, which is said to be a good small harbour.

DUMARAN ISLAND, separated from Endeavour point by Cook channel, is about 16 miles in length by 7 miles in breadth, and about 600 feet in height. It is of irregular form, and has no remarkable features by which to distinguish it, the hills being of about the same elevation, and are thickly wooded, with the exception of a few in the neighbourhood of the settlement on the north shore, and near the north part of the island. Views *a* and *b*, at page 100.

The north-west and north sides of Dumaran have reefs upwards of 3 miles from the coast in some places, with deep water between. The north extreme of the island terminates in a white cliff with rocks awash just eastward of it.

Also chart 2578.

The eastern part of the island terminates in a peninsula known as Pirate head, south-eastward of which is Raquit islet, moderately high and sparsely wooded, connected with the shore by a reef and sandy isthmus awash at high water.

Araceli bay is a large indentation on the south-west side of Pirate head, affording good shelter in 5 fathoms, sand, off the town of Araceli. The bay is fronted by several islets.

The town of Araceli is situated on the south side of Pirate head facing Araceli bay. The church and convent are situated near the beach, and are conspicuous; the remainder of the town is partially hidden by cocoa-nut trees.

A reef, dry at low water, with large boulders always visible, projects southward from the eastern part of the town, and forms a protection to the anchorage. Westward of the town there is a large deep basin fringed with mangroves, but the entrance is contracted and obstructed by shoals extending from both sides, the points of which are usually marked by stakes.

General charts 943, 2660b, 1263.

Charts 967, 2578. Var. 1° 20' E.

Anchorage may be had as above mentioned, behind the reef making off southward from the town, with the church bearing N. 29° E., and the south side of Raquit islet S. 87° E. Small vessels with local knowledge may enter the basin westward of the town, where they will find perfect shelter. Vessels are recommended to approach Araceli between Langoi and the islet north-east of it. A good look-out must be kept for the reef off the western entrance point, and for the shoal described below.

Kimitad or Wedge island, similar in size and height to Raquit, lies south-eastward of it, and appears like a wedge when viewed from northward or southward. A reef, partly bare at low water, extends some distance south-westward from it.

Langoi or Christmas island (*Lat. 10° 30' N., Long. 119° 59' E.*), the south-western of the three islands fronting Araceli bay, lies 3 miles south-westward from Kimitad island. It is fairly well wooded, and has a reef projecting westward which affords a sheltered anchorage for small craft. Between Langoi and Kimitad is Mantulary, an islet 60 feet high, with reefs projecting a short distance westward and north-eastward from it; the passage between this islet and Kimitad is reported to be foul, as is also that between Kimitad and Raquit. *See view b, at page 100.*

Dangers.—At about 1½ miles south-westward from Langoi island is a 3-fathoms patch of coral, and there is also one of 4 fathoms at 8 cables north-westward of the same island.

Off the south point of Araceli bay, at the east end of Dumaran, is a patch of 5 feet, half a cable in extent, situated with Langoi island, bearing S. 4° E., and Kimitad island, S. 84° E.

Chart 967, Paláwan island.

At 4½ miles south-west of Langoi island, abreast Green point, the south point of Port Lankang, is a rocky bank with 4 fathoms water. Also, south-west of Green point, fronting an opening, is a 2½-fathoms patch, lying 1¼ miles from the shore, from which South hill, on the southernmost part of Dumaran island, bears N. 86° W.

At 2 miles S. 82° E. from the extreme south point of Dumaran, there is a rocky head of 4 fathoms 1½ miles off-shore, with a depth of 8 fathoms inside it.

Nearly midway between Barton point and the inner sand cay, lying off the coast of Paláwan between High and Endeavour points, is a patch of 3 fathoms, and possibly less, with the south point of Dumaran bearing N. 85° E., and Endeavour point N. 3° W.

Port Lankang is a large inlet nearly 3 miles deep, in about the middle of the south-eastern coast of Dumaran, northward of Green point. It is reported to be a good harbour, but no further information in regard to it is available.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Barton point (*Lat. 10° 28' N., Long. 119° 46' E.*), the south-western extreme of Dumarán, has a bank with $2\frac{1}{2}$ fathoms water projecting $1\frac{1}{4}$ miles to the westward.

Dumarán village lies $4\frac{1}{2}$ miles northward of Barton point, at the head of a small bay, abreast Endeavour point. The small fort stands on a hillock close to the landing place, a church forming part of the interior arrangements of it.

The village, with about 100 inhabitants, is prettily situated amongst some cocoa-nut trees, and there is a considerable tract of land under cultivation.

Supplies.—Rice, maize, sweet potatoes, tobacco, and cotton are grown, both for the consumption of the inhabitants and for the purposes of traffic. Pigs, goats, and fowls are also plentiful. There is not any eligible watering place in the bay.

Anchorage.—Shelter from north-east winds will be found on the west side of Dumarán in from 9 to 12 fathoms, mud, south-south-west of the bay where the village is; bearing in mind, however, that a reef extends $1\frac{3}{4}$ miles in a southerly direction from the west point of it, and also that the western coast of the island from Barton point is fringed with coral, which at low water dries from 4 to 5 cables off. To avoid the end of the former danger, do not bring Drake peak, Paláwan, 1,300 feet high, to the southward of N. 87° W.

Small vessels may anchor in 4 or 5 fathoms east of the spit, about a mile from the fort; but the bay is much contracted by reefs, and exposed to southerly winds.

Monk and Friar islets.—At $2\frac{1}{2}$ miles north of the northern extreme of Dumarán island are Monk and Friar islets, an islet with a barren rock about 60 feet high, one mile S. 73° W. of it. The islet and rock are connected by a reef.

Kambari or Tre pang island is a small wedge-shaped island, lying $5\frac{1}{2}$ miles eastward of Pirate head.

COOK CHANNEL, between the coast of Paláwan and Dumarán island, is $1\frac{1}{4}$ miles wide and has its northern entrance from the bay previously described, northward of Endeavour point. The northern part of the channel is contracted by several small islands to three-quarters of a mile in width. There is a rocky spit, with a sandbank on it, dry at low water, extending $1\frac{3}{4}$ miles southward from the western point of Dumarán island.

The depths among the islands at the northern entrance average 10 fathoms, off Endeavour point about the same, and deepen to 12 and 15 fathoms, mud bottom, at the southern entrance.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

The tidal stream sets rapidly through the channel, and it should not be attempted by a sailing vessel, unless under favourable circumstances.

Islets and dangers in Cook channel.—Of the islands in the northern entrance of Cook channel, the three largest lie on the eastern side or Dumarán shore in a north and south direction.

Mayabakan or Goat island (*Lat. 10° 36' N., Long. 119° 45' E.*), the northernmost on the eastern side of Cook channel, is 380 feet in height, and has a rocky head just detached from the north extremity. From it South channel island bears S.S.W., distant $2\frac{1}{2}$ miles.

A 3-fathoms coral patch lies W. $\frac{3}{4}$ N. one mile from the summit of this island, with depths of 14 to 16 fathoms close-to, and one mile northward of the patch is a rock awash. At $1\frac{1}{4}$ miles N.N.E. of Goat island is the commencement of a chain of reefs extending about 3 miles in the direction of the north point of Dumarán.

A spit extends about a quarter of a mile from the west side of the central island.

South Channel island is 2 cables west of the southernmost of these three, and is connected with it by a reef awash in some parts at low water.

Reef and Bivouac islets.—On the west side of Cook channel are four small and one larger island. The latter, 200 feet in height, lies nearly west about 2 miles from the centre island on the opposite side, and fronting it are Reef and Bivouac islets.

Bivouac islet, the northern of the two, is 160 feet high, bold to approach, and has a rocky head on the north-east side, with a depth of 4 fathoms close to it.

Reef islet, lying S.S.W., half a mile from Bivouac, is surrounded by coral, which, in a southerly direction, extends 4 cables from it, contracting this part of the channel to three-quarters of a mile in width.

North Channel island lies about half a mile north-west of Bivouac islet, and from it a reef projects 2 cables in a north-east direction; there is a dry sandbank on the south-west side.

A rock awash lies apparently in the centre of Cook channel, at 3 cables from the edge of the reef on the south-east side of South channel island, with the summit of the large island bearing N.N.E., distant three-quarters of a mile, and Endeavour point W.S.W. the same distance.

Directions.—To steam through Cook channel from the northward bring Mayabakan island to bear S. 2° E. as soon as the northern extreme of Dumarán bears East, and steer for Mayabakan; this

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

avoids the chain of reefs lying between the island and the point. Pass westward of Mayabakan, at a distance of not more than half a mile to avoid the 3-fathoms patch between it and North channel island. Having passed Mayabakan edge a little westward, avoiding the spit which extends from the west side of the central island, and pass midway between South channel island and the Paláwan shore; then close that shore to avoid the rock awash in mid-channel, having passed which haul a little eastward to clear the shoal water southward of Endeavour point, remembering the spit extending southward from the western point of Dumarán, on the opposite side of the channel (page 90). When the southernmost of the three islands on the eastern side of the channel bears North, the vessel may be steered South, passing midway between the $2\frac{1}{2}$ -fathoms shoal off Barton point and the 3-fathoms patch lying S. 73° W. 3 miles from the same point.

Also chart 2578, E. part of Sulu or Mindoro sea.

KARANDAGA ISLANDS, situated east-north-eastward, distant from 15 to 21 miles from Dumarán island, consist of two islands and three islets or rocks.

Dalanganem, the southernmost island, is 3 miles in extent from north to south, and has a high precipitous conical head, connected with the south part by a low narrow isthmus; and a detached rocky head with an islet off, at its northern extremity. There is a small village in Wreck bay, on the western side of the isthmus.

Karandaga or Madukang island (*Lat. $10^{\circ} 43'$ N., Long. $120^{\circ} 15'$ E.*), 926 feet high, lies northward of Dalanganem, the channel between, with a depth of 10 fathoms, being 6 cables wide. The island is $1\frac{1}{2}$ miles in extent, and has two precipitous rocky peaks projecting in a north and north-west direction forming its highest part, from which also a saddle shoulder slopes to the southward. Indong islet is connected with the south-east side of the island.

Kauayan, or Bird islet, is situated 5 miles eastward of the north end of Dalanganem; Kasirahan, or White islet, lies $2\frac{1}{2}$ miles N. 25° W. of Kauayan. There are depths of 19 to 30 fathoms close around the two islands, and 40 fathoms between the two islets.

Tides.—It is high water, full and change, at the Karandaga islands at 9h. 30m.; springs rise 6 feet.

Chart 967, Paláwan island.

COAST.—The coast from Endeavour point trends south-westward for 12 miles to High point (*Lat. $10^{\circ} 23'$ N., Long. $119^{\circ} 34'$ E.*), which is a bold headland surrounded by a reef which extends a short distance off.

Midway between is Squall point, from which a range extends northward, meeting the coast at the same distance on the other side

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

of Endeavour point, having Drake peak, a sharp hill 1,300 feet in height, on the southern part, and a double peak 1,400 feet in height northward of it.

Illan.—Two miles northward of High point, where the low land joins the foot of Mount Baring, is a small river, with a village named Illan, of 100 inhabitants, on the right bank, half a mile from the entrance. The river water is fresh at the village. A coral spit extends nearly three-quarters of a mile from the south point of the entrance.

Sand cays.—Two reefs lie off this part of the coast. The outer, about $1\frac{1}{2}$ miles in diameter, is very dangerous, has a sand cay in the centre, and lies $4\frac{1}{2}$ miles from the shore, and N. 82° E. $6\frac{1}{2}$ miles from High point. The other, $2\frac{1}{4}$ miles in-shore of it, has also a sand cay. It is reported that these reefs lie farther eastward than charted, and that the cays are covered at high water. Reefs and sandbanks extend nearly 2 miles off the coast north-eastward of Squall point.

GREEN ISLAND BAY.—From High point the coast curves westward and south-westward, forming Green island bay, 32 miles wide and 6 miles deep. The bay contains several low coral islands and numerous reefs and sandbanks.

Mount Baring, within High point, attains an elevation of 2,100 feet. Bay peak, a conical hill about 1,800 feet in height, is situated close to the sea, about $3\frac{1}{2}$ miles westward of High point.

Barbakan.—A small river discharges at 11 miles westward of High point; the approach is shallow and the surf breaks heavily there at times. On the right bank, at half a mile up, is the village of Barbakan, protected by a stockade built on the summit of a hill overlooking it. At 2 miles eastward of the river is Barbakan point.

At Cliff point, 5 miles south-westward of Barbakan river, a ridge of low hills, named the Barbakan range, joins the coast, and within these is a higher range, with double peaks and long flat spurs. Farther south-west is a range named by the old navigators the Four peaks, of which Cleopatra's needle, 5,200 feet in height, is the southernmost and highest.

Bold or Acantilada point (*Lat. $10^{\circ} 2' N.$, Long. $119^{\circ} 10' E.$*), the southern entrance point of Green island bay, has a double hill over it, and is, as regards both the aspect of the land and the depth of water near it, quite what the name implies.

Islands and dangers in Green island bay.—Hog island, lying 6 miles S. 54° W. of High point, and about 3 miles from the shore, is 300 yards in extent, with a reef projecting 4 cables from the eastern side, and a rock awash one mile east of it.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

A sandbank, about a mile in extent, lies about $2\frac{1}{2}$ miles westward of Hog island and nearly the same distance from the mainland; there is a depth of 6 fathoms between the sandbank and the shore reefs, which in this part extend out to the distance of one-mile.

Green island (*Lat. 10° 17' N., Long. 119° 29' E.*) lies $6\frac{1}{2}$ miles S. 33° W. from High point; it stands on the western side of a quadrangular-shaped reef $1\frac{1}{2}$ miles in length, and nearly one mile in breadth, at the eastern corners of which are some rocks awash and a dry sandbank with a depth of 12 fathoms close-to.

At 9 miles E. $\frac{3}{4}$ S. of Green island is a coral reef, with apparently a depth of 3 fathoms over it, from which High point bears N. 35° W., distant 8 miles; an 8-fathoms patch lies $1\frac{1}{2}$ miles north-eastward from the 3-fathoms reef. At $2\frac{3}{4}$ miles N. 60° E. from Green island is a 5-fathoms patch, with 16 to 17 fathoms around; there is also a coral patch of $4\frac{1}{2}$ fathoms on the same bearing, but 7 miles from Green island, and at $1\frac{1}{2}$ miles south-east of the latter patch, another bank, which probably has less water than that given on the chart, viz., 7 fathoms.

Between the bearings of High point N. 45° W., distant $6\frac{1}{2}$ miles, and Green island N. 28° W., distant 2 miles, two large coral shoals are charted extending over a length of 9 miles in a west-south-west and opposite direction, with a width of $2\frac{3}{4}$ miles; the depth of $2\frac{1}{2}$ fathoms is shown on the eastern end of the eastern shoal, in a position from which Green island bears S. 78° W., distant about 9 miles.

Between the two shoals is a deep channel about one mile wide, from the centre of which, Bay peak on Paláwan island bears N. 25° W.

As these shoals have not been examined, less water probably exists.

Reef island, from the east side of which a coral shoal projects three-quarters of a mile, lies west-north-west $2\frac{1}{2}$ miles from Green island, with depths of 12 and 14 fathoms between.

Shell island lies about $2\frac{1}{2}$ miles southward of the mouth of the Barbakan river and $3\frac{1}{2}$ miles N. 77° W. from Reef island. It has a shoal extending one-third of a mile from its north-western side, and a sand patch at 6 cables south-westward. Midway between Reef and Shell islands is a sandbank and reef.

Flat island, the largest island in the bay, lies S. 51° W. $2\frac{1}{4}$ miles from Shell island, and about 2 miles from the shore at Cliff point.

Stanlake island lies about 2 miles south-westward from Flat island, to which it is next in size. There is a depth of 8 fathoms between them, decreasing to 2 fathoms off Cliff point, abreast the latter island. A sand patch lies $1\frac{1}{2}$ miles eastward of Stanlake island.

General charts 943, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 20' E.

Howley island lies S. 55° W. 3½ miles from Flat island and 1½ miles from the shore, with a reef between; there is a sandbank S. 13° W. 1½ miles from Howley island.

Johnson island (*Lat. 10° 15' N., Long. 119° 22' E.*), the south-easternmost island in Green island bay, lies 18 miles north-eastward from Bold point, and about 4½ miles from the shore. It is nearly a third of a mile in extent, and partly surrounded by a reef, which on the western side projects 4 cables. There is a small islet midway between Flat and Johnson islands.

A bank, consisting of sand and coral, 1½ miles in extent east and west, dries at low water 2½ miles S. 5° W. of the island, with a 2-fathoms patch outside its eastern part; close to the southern edge of these are depths of 13 to 15 fathoms. There is also rocky ground with 4 fathoms and 18 to 20 fathoms, mud, around, with the island bearing N. 24° W., distant 3½ miles. The depths from 4 to 6 miles south-eastward of the group in Green island bay average about 25 fathoms, sand and mud bottom; sometimes red coral is brought up with the lead.

North and South Green islands lie near the shore at the southern end of Green island bay. Together they are nearly 4 miles in length; they are reported to be from 2 to 5 miles farther southward than shown on the chart. Farther northward are Reynard and another small islet unnamed. The village of Caramay is situated about 2 miles N.N.W. from the north end of Reynard islet.

Dangers.—A reef of small extent that dries at low water lies 1½ miles N. 85° E. from the northern end of North Green island, with the south extreme of Reynard islet bearing N. 59° W., distant one mile; a 2-fathoms patch lies half a mile south-westward of it. The town of Tinitian is situated on the coast abreast of the southern end of South Green island. Anchorage with some protection in north-easterly weather may be had southward of the southern island in 4 fathoms, with the church bearing N. 69° W., and the south-west point of the island N. 12° W.

The Green islands and the shores in the vicinity are low, fringed with mangroves, and apparently but a few feet above high water. At three-quarters of a mile south of the south island a reef dry at low water extends 4 cables from a point on the mainland.

Pasco channel, between the North and South Green islands and the shore, is from one to 3 cables wide, with reefs on either side of it. A rock awash, with 7 fathoms close-to, lies immediately in the northern entrance. For reef to the southward, *see* above.

It is reported that Pasco channel is only fit for boats.

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

Current.—In the month of June a current setting northward at the rate of $3\frac{1}{2}$ knots an hour has been observed in Pasco channel.

Off-lying shoals.—Pasig shoal (*Lat. 9° 54' N., Long. 119° 28' E.*), with a depth of 2 fathoms, lies 19 miles east-south-eastward of Bold point, and extends about one mile in a north-north-west and opposite direction, with a breadth of about 5 cables. It appears to be the south-easternmost of a chain of shoal patches, connected by shallow water with Charybdis bank and Constancia shoal. Depths of 6 and 7 fathoms were obtained on the south-east side of the shoal, but a short distance to the north-west there are patches of 2 to 3 fathoms, or less in places.

There is another patch, with 2 fathoms on it, lying $1\frac{1}{2}$ miles N. 37° W. from Pasig shoal, and there was apparently a third patch about the same distance north-west of the second.

With the sun in a suitable position, these patches show distinctly; others, however, may exist in this neighbourhood.

Charybdis bank, with 4 fathoms water, is charted about 3 miles N. 18° E. from Pasig shoal.

Constancia shoal, with $3\frac{1}{2}$ fathoms, is charted N. 37° W. $5\frac{1}{2}$ miles from Pasig shoal.

DEEP (HONDA) BAY.—From Bold point (page 93) the coast trends westward and then southward to the entrance of Puerto Princesa, forming Deep (Honda) bay, which is 31 miles wide and 9 miles deep. Like Green island bay it contains numerous islets and banks surrounded by a moderate depth of water.

Pasco point, nearly 9 miles westward of Bold point, is low, covered with mangroves and not prominent unless close inshore; at $3\frac{1}{2}$ miles westward of the point a reef projects one mile southward from the shore.

Castle point, lying $5\frac{1}{2}$ miles westward from Pasco point, and probably named from a rocky protuberance on the brow of a hill over it, is the end of a bold range of hills, which borders the coast from Green island bay.

Addison point, nearly 8 miles westward from Castle point, forms the eastern entrance point of Tapul bay, from the head of which to Ulugan bay on the other side of Paláwan, the island is only 4 miles wide.

MOUNTAINS.—Aspect.—Mount Peel, 3,600 feet in height, situated about 5 miles north-westward of Tapul bay, has an abrupt fall in the spur extending towards Mount Airy. On the eastern side a second peak, Ba hé li, precisely similar in feature,

General charts 943, 26606, 1263.

Chart 967, Palawan island. Var. 1° 30' E.

rises to an elevation of 2,406 feet, from which a slope extends in a south-easterly direction nearly across the island.

Mount Airy is a double-top summit at the foot of Mount Peel; between it and Mount Herschel the ridge is low.

Mount Herschel, $7\frac{1}{2}$ miles south-westward of Mount Peel, is 2,316 feet in height, and slopes to the south-westward.

In approaching Deep bay from the eastward Mounts Herschel and Airy appear as two islands between Mount Peel, 3,600 feet in height, and the range to the southward.

Islands and dangers in Deep bay.—Four low coral islands, covered with trees, lie in the bay in a line parallel with the shore; between these and the shore is another group of four islands, reefs and dry sand patches, all of which have been but imperfectly examined.

Anchorage island (*Lat. 9° 56' N., Long. 118° 55' E.*), about 3 miles in circumference, the north-easternmost and largest of the group, has a reef fronting the eastern side, which at low water dries off 3 cables, and a rock awash at nearly three-quarters of a mile from the north-west point, with a bank extending about a mile westward of it, on which the depth is $2\frac{1}{2}$ fathoms. The channel inside this island is encumbered by two reefs, with dry sand patches on each, and a shallow spit which extends half a mile from near Castle point.

Between Castle point and Anchorage island the depths vary from 3 to 9 fathoms.

A shoal, with general depths over it of from 2 to 6 fathoms, and about 3 miles long in a north-easterly and south-westerly direction, and $1\frac{1}{4}$ miles broad, lies eastward of Anchorage island. The north-eastern end of this shoal is situated at a distance of $6\frac{1}{2}$ miles N. 72° E. from the northern point of Anchorage island, and the south-western end $4\frac{1}{4}$ miles S. 79° E. from the same point.

Reef island, lying $2\frac{1}{2}$ miles west-south-westward of Anchorage island, is, including the reef that surrounds it, upwards of a mile in extent, and there is a sandbank, dry at low water, at 3 cables from its south-west extreme.

Makesi island, situated west-south-westward 4 miles from Reef island, is three-quarters of a mile in circumference, and has shoal water extending $1\frac{1}{2}$ to 2 miles from its southern and half a mile from its northern point.

A rocky bank, nearly dry at low water, $1\frac{3}{4}$ miles in length in a north-west and south-east direction, lies half-way between Reef and Makesi islands; northward of the bank, and between Reef island and

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

the shore, a distance of $3\frac{1}{2}$ miles, are two of the four islands composing the inner group, with a dry sand patch off the outer extremity of each. A reef is charted at one mile north-westward of the bank. The depth of water between the rocky bank and Reef island is 13 fathoms.

Meara and Fraser islands lie in-shore and to the westward of Makesi island. Fraser island, which is the eastern of the two, has shallow water extending some distance off its eastern side.

A reef, partly dry at low water, lies half a mile south-east of the north point of Mangrove inlet abreast, and Bush islet lies close to the shore at one mile northward of it.

Ramesamei (*Lat. 9° 51' N., Long. 118° 45' E.*), the southwesternmost of the four low coral islands, mentioned above, lies in a bend on the western side of Deep bay, a mile from the shore, and $7\frac{1}{2}$ miles northward of Puerto Princesa. It is surrounded by a reef to the distance of a quarter of a mile; Tuft or Canon islet lies three-quarters of a mile south-east from it.

There are depths of 3 and 4 fathoms within Ramesamei and Meara islands, and of 10 fathoms near the entrance of Mangrove inlet.

Tapul bay, within these islands, previously mentioned as lying westward of Addison point, was at one time used by the Spaniards as a military station.

The channel leading to it is between Fraser and Makesi islands:—To enter, pass the shoal off the north-west point of Makesi at about one cable, and steer N. 17° W. for a hill with trees on it, situated in a remarkable ravine. The depth will be 9 fathoms until near Bush islet, when the vessel should haul to the northward and anchor in the middle of the bay in from 4 to 6 fathoms, with Addison point bearing E.S.E.

Off-lying banks.—A bank with 17 fathoms lies $5\frac{1}{2}$ miles south-east of Bold point.

A shoal about $1\frac{1}{4}$ miles in extent, with $5\frac{1}{2}$ fathoms on it, is reported by the Master of the s.s. *Garcia Pitogo* to exist to the eastward of Deep bay. From the south-west extremity of this shoal, Reef island bears N. 66° W., distant $8\frac{3}{4}$ miles.

A bank upwards of 2 miles in extent, with 5 fathoms on it, lies about $2\frac{1}{2}$ miles west-south-westward of the above shoal and $6\frac{1}{2}$ miles S. 22° E. from Anchorage island; these two lie about 2 miles outside a line between Bold point and the entrance to Puerto Princesa.

A small coral bank, with apparently a depth of from 10 to 15 fathoms over it, lying about 17 miles eastward of Puerto Princesa, was passed over by the U.S.S. *General Alava* in November, 1901.

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

No soundings were obtained on this bank, which may possibly be a danger, and should therefore be given a berth.

Plan 2914, Port Princesa.

PUERTO PRINCESA (*Lat. 9° 44' N., Long. 118° 43' E.*) (native name Iuahit), formerly known as Port Royalist, is a large inlet extending about 6 miles in a north-westerly direction, and is situated at the southern end of Deep bay.

Aspect.—The port is surrounded by a densely-wooded plain, fronting a high mountain ridge to the south-west of Mount Peel, of which Mount Beaufort, 3,680 feet, Thumb peak, 4,260 feet, and Mount Stavely, 3,930 feet, are conspicuous. Mount Beaufort, the northernmost, has a hollow in its highest part; Thumb peak, when seen from the south-east, appears as a steep conical mountain with a knob on the summit, and when in line with the entrance of the harbour bears N. 60° W. Mount Stavely is a needle peak rising from the centre of a table-top immediately northward of a sharp shoulder 3,606 feet high. Farther south-westward are the Anipahan peaks, the northern being the sharper. *See* views on plan 2914.

Entrance.—Depths.—The entrance, between Bancaobancaon point on the north, and Panagtaran point on the south, is 2 miles wide, but the navigable channel is contracted to a width of one mile by reefs which extend from either entrance point. The channel is about 3 miles in length in a west-north-west direction, and then turns northward towards the head of the port.

In the entrance the depth is 25 fathoms, mud, which decreases as the head of the port is approached to 4 and 5 fathoms close to the reef. The north and western shores are chiefly mangrove, the former having several bays and inlets, all of which are shoal and fronted with coral.

Coral spits project from both the outer points of the entrance and contract the channel to one mile in width. The South spit extends 7 cables north-eastward from the shore, while the North spit projects 5½ cables south-eastward; parts of both dry at low water.

The reefs forming these spits extend along the coast outside, and that on the north has several dry patches. Spits extend off portions of the coast within, for which *see* the plan.

Clearing marks.—Mount Beaufort over Saboruko point, N. 50° W., leads one cable north-eastward of South spit, but south-westward of Polillo rock.

Thumb peak just open of Saboruko point, N. 64° W., leads half a cable south-westward of North spit.

General charts 967, 2660b, 1263.

Plan 2914, Port Princesa. Var. 1° 30' E.

Inlets.—There are two inlets within the entrance on the south side. The eastern has a rock named Village rock at its entrance, lying off a red cliff, which when first seen may be easily mistaken for some native huts; *see* view on plan 2914. The western and larger inlet is about $1\frac{1}{2}$ miles in length, and has a coral spit projecting nearly 4 cables from Heron point, its north entrance point. There are depths of 5 to 10 fathoms in both these inlets, but their entrances are much contracted by the coral reefs on either side. These inlets afford good sheltered anchorage for small vessels, which visit them to load timber. A detached rock, with $1\frac{1}{2}$ fathoms on it and deep water around, is reported to lie in the western part of the western inlet.

Iwahig or Ewiig river (*Lat. 9° 44' N., Long. 118° 41' E.*) lies on the western side of the port, and has a small island in the entrance.

This river is navigable for boats about 4 miles, to a village which carries on a small traffic in beeswax, rice, maize, &c., with some of the contiguous settlements. At the village there is a penal reservation. After heavy rains the river is fresh almost at the entrance.

Mud dries at low water nearly three-quarters of a mile from the entrance, through which are two boat channels diverging from either side of the island at the mouth of the river.

Saboruko or Tidepole point, on the northern side of the channel, about 2 miles from the entrance, may be recognised by the light-station, which is white and conspicuous. The point is steep-to on the south side, but a reef fringes the shore from here to the mole, extending in some places to $2\frac{1}{2}$ cables; *see* view on plan 2914.

Dangers.—**Polillo rock**, with a depth of 4 fathoms over it and about half a cable in extent, is situated in the entrance to Puerto Princesa in a position from which Panagtaran point bears S. 29° W. distant $9\frac{1}{2}$ cables.

Gedeon shoal.—**Buoy.**—About $3\frac{1}{4}$ cables westward of Obando mole, is Gedeon shoal, of coral, about $2\frac{1}{2}$ cables in length and one cable wide, upon which the least depth is 4 feet; a black can buoy is moored on its south-eastern edge.

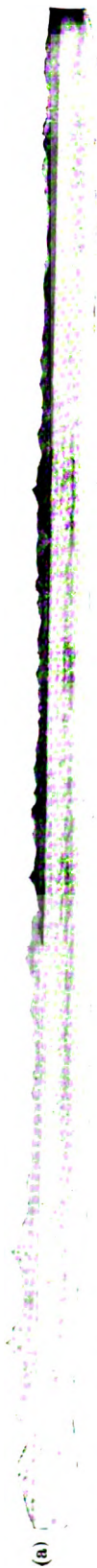
A small detached coral patch with less than 9 feet water over it lies one cable southward of the shoal.

A ridge, about $3\frac{1}{2}$ cables in length north-east and south-west, with depths over it of from $5\frac{1}{2}$ to 7 fathoms, lies $4\frac{1}{2}$ cables south-west of Saboruko point, on the southern side of the fairway.

LIGHT.—A *red fixed* light, visible 9 miles in clear weather, is exhibited at an elevation of 43 feet above high water and 25 feet above the ground, from an iron frame rising from the front of a white house on Saboruko point.

Caná or Harbor island lies off the largest opening on the north shore of the port; and besides being connected with the shore

General charts 967, 2660b, 1263.



Bay peak, West, 30 m. W. by N. $\frac{1}{2}$ N. South hill. Dumaran island, S.W. part.



N.W. $\frac{1}{2}$ N., 11 m. Dumaran island, N.E. part. Langoi or Christmas I. N. $\frac{1}{2}$ W., $6\frac{1}{4}$ m. Dumaran Island from the South-east; 2 views. Kimtad or Wedge I., North, 9 m.



Reef island, N. 41° W., 7 m. Bulanhau range. N. 22° W., $7\frac{1}{2}$ m.



Pagoda cliff, N. 1° W., $21\frac{1}{2}$ m. South-eastern part of Paláwan Island; 2 views from one mile N.W. by N. of Ursula Island. Mantalingahan range. N. 14° E., 12 m. Pirate island, N. 30° E., 30 m. Mt. Addison.

Plan 2914, Port Princesa. Var. 1° 30' E.

by reefs, has a rocky spit and some detached coral patches extending $8\frac{1}{2}$ cables from it in a southerly direction, the outer one being a rock awash at low water springs, with a depth of 6 fathoms close-to.

Anchorage (*Lat. 9° 45' N., Long. 118° 43' E.*).—During the north-east monsoon the best place to anchor is above Gedeon shoal, eastward of the rock awash before mentioned and north-north-west from Obando mole, in about 11 fathoms, mud. The depths in the anchorage of Puerto Princesa are stated to be from 7 to 10 fathoms (1910).

In the other season vessels may lie farther to the southward.

Anchorage may be taken southward of Gedeon shoal in 12 to 16 fathoms, mud, where there is ample space; the most convenient appears to be from about 4 cables south-west of Princesa or Bateria point to 3 cables north-west of the same point.

Directions.—It is not until a vessel approaches within a mile of the entrance that soundings will be obtained, when from 120 fathoms the depths suddenly decrease to 20 or 30 fathoms, sand. This change is sometimes marked by a ripple on the surface. The coast on either side of the approach should be given a berth of at least a mile.

A vessel entering should bring the lighthouse on Saboruko point to bear N. 58° W. and steer for it, which course will lead in mid-channel between the entrance points; Thumb peak just open of Saboruko point leads south-westward of the North spit, and Mount Beaufort in line with the same point leads north-eastward of the South spit.

Having passed the spits haul westward and steer to pass about 2 cables from Saboruko point; when that point is abeam at the distance mentioned, head for Mount Beaufort, steering N.W. $\frac{1}{4}$ W., until Obando mole head bears N. by E. $\frac{3}{4}$ E., when a North course will lead midway between the mole head and Gedeon shoal. The shore reef and Gedeon shoal are both steep-to, with depths of 12 to 14 fathoms, and the passage between them is $2\frac{1}{2}$ cables in width. Anchor as convenient 3 or 4 cables above the mole in a depth of from 11 to 14 fathoms, mud; *see* Anchorage, above.

It is recommended not to go beyond half a mile to the northward of the mole, as the channel between the reefs becomes narrow.

During easterly winds a heavy swell sets into the entrance, which breaks violently on the reefs, and also across the bay to the southward of the river.

Tides.—It is high water, full and change, approximately, at Puerto Princesa, at 11h. 23m.; springs rise $3\frac{1}{2}$ feet.

Puerto Princesa (*Lat. 9° 44' N., Long. 118° 43' E.*).—The town of Puerto Princesa, the capital of Paláwan province, is situated on Princesa point, on the eastern side of the harbour, and being com-

General charts 967, 2660b, 1263.

Plan 2914, Port Princesa. Var. 1° 30' E.

posed principally of Government buildings presents an imposing appearance from the water.

Obando mole, about 143 yards long, partly stone and partly wood, with 11 feet of water at the end, extends north-westward from the foot of the hill on which the town is situated.

Supplies.—No supplies are obtainable. Water may be procured from the Iwahig river, but in the dry season boats must go some distance up for good water.

Chart 967, Paláwan island.

COAST.—From the entrance to Puerto Princesa the coast trends south-south-westward for 3 miles to Table head, which is low and has a small inlet for boats on its northern side.

From Table head (*Lat. 9° 38' N., Long. 118° 44' E.*) the coast trends south-westward for 37 miles to Bivouac point, and is low and thickly wooded. Victoria peak (double), 5,680 feet in height, overlooks it, and the mountain range, which presents some deep gorges and picturesque valleys, is fronted by an extensive and densely wooded plain; about 6 miles north-north-eastward of Victoria peak is a peak 5,000 feet in height; the hills approach the sea near Table head.

On the south part of the range, End peak, 4,512 feet high, is the most conspicuous, having a small double top, with a shoulder at the back, from which the land falls rather abruptly. The southern face slopes gradually towards the plain, while a part of the same ridge (on which is Sultan peak, 3,820 feet high) lies in a south-easterly direction, and terminates in a long table spur overlooking Island bay.

Water.—There is a good fresh water stream 5 miles south-westward of Table head.

Inagauan village, not shown on the chart, is situated about 8 miles south-westward of Table head, it is small, and not visible from seaward. Vessels desiring to communicate with this place should bring Masterson point to bear N. 68° W., and when 2 miles distant from it steer West for the anchorage, about one mile south-westward from Masterson point. A shoal of 5½ fathoms lies 2½ miles east-south-eastward of Masterson point.

Village bay, in which are a few huts, 10½ miles south-westward of Table head, is small, and a coral patch 6 cables in extent occupies its centre. Off the south point of the bay are two islets connected with the shore by a reef, and a reef fronts the north point to the distance of a mile.

Maltby island or Malanao (*Lat. 9° 27' N., Long. 118° 36' E.*), situated 2¾ miles S. 13° W. from the eastern entrance point to Village bay, is separated from the shore of Paláwan by a channel one mile wide, which has not been sounded. The island is about 2 miles long

General charts 967, 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

and one mile broad, low and covered with trees. A rocky spit extends 4 cables from the south-west point of the island.

The town of Aborlan lies on the mainland directly westward of the southern end of Maltby island.

30th of June island, named Sombbrero island in the Philippine islands Sailing Directions (U.S.), lies nearly 4 miles S. 28° W. from Maltby island and 2½ miles off-shore. It is very small, low, and wooded, and surrounded by a reef which on the eastern side extends 4 cables from the island. It forms a good landmark, the trees being about 60 feet high.

Two dry sandbanks on reefs lie between 30th of June and Maltby islands, the depth of water in the vicinity being from 4 to 7 fathoms, and there is a reef awash three-quarters of a mile north-westward from the former island.

Off-lying shoals.—East, 6 miles from 30th of June island, there is a bank of sand and coral upwards of 5 miles in extent, on which the least water discovered is 6 fathoms; close outside there is no bottom at 80 fathoms; the depths within the bank vary from 8 to 21 fathoms.

Rocky ground extends about 5 miles in a northerly direction from this bank, where, at the extremity, there is as little as 3½ fathoms, perhaps less.

This patch lies east of Village bay about 2¼ miles from the shore.

Sand island (*Lat. 9° 15' N., Long. 118° 29' E.*) lies 8¾ miles S. 32° W. from 30th of June island. It is one-quarter of a mile in extent, covered with wood, and surrounded by a reef dry at low water, which, on the eastern side, extends half a mile from the island, with depths of from 6 to 12 fathoms close to the edge.

A reef is reported to exist about midway between 30th of June and Sand islands. It has 1¼ fathoms of water on it, coral bottom, and lies with Native point bearing S. 72° W., distant about 3½ miles. About midway between this reef and Calver point to the northward, is a reef half a mile in length and narrow, on which the least known depth is 3 feet, and a reef with 4 feet on it lies about 2¼ miles north-eastward of Native point and three-quarters of a mile off-shore.

At 1½ miles S. 53° W. from the centre of Sand island, is a 5½-fathoms patch of coral.

Rasa or Flat island, lying 6 miles north-eastward of Bivouac point, and fronting Mantakwin bay, is 2 miles in extent, north and south, low, and covered with trees. It is separated from a sandy tongue projecting from Casuarina point on the mainland, by a channel 4 cables wide, in which there is a depth of 8 fathoms. On its north-east face a coral spit extends half a mile.

A shoal of small extent, with 5 feet water on it, lies three-quarters

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

of a mile northward of Rasa island, with Casuarina point bearing S. 59° W., distant $1\frac{1}{2}$ miles.

Mantakwin bay.—In Mantakwin bay, westward of Rasa island, there is good shelter from north-east winds in a depth of 5 to 6 fathoms, mud, with the south-west extremity of the island bearing S.E., and Emmeline island, the southernmost of some small islands just detached from the opposite shore, S.W. by W.

A reef projects 6 cables southward of Casuarina point in the north entrance, with 8 fathoms close-to, and a dangerous shoal, with about 6 feet of water on it, is reported to exist about $1\frac{1}{2}$ miles southward from the same point.

A reef covered with one fathom water lies in the middle of the south entrance.

Emmeline island is bold to approach, but the reef, which fronts the south and western shores of Rasa or Flat island, extends 4 cables, with a depth of 8 to 9 fathoms close to the edge.

Water may be obtained from a small river halfway between Emmeline island and Casuarina point, which is fresh to its mouth at ebb tide.

Caution is necessary in going into Mantakwin bay, as it has been only partially sounded.

Tides.—It is high water, full and change, at Flat island, off Casuarina point, at 9h. 30m. ; rise of tide $6\frac{1}{2}$ feet. *See* general remarks on page 79.

Shoals.—A shoal half a mile in extent, with a depth of 4 fathoms over it and 10 fathoms around, is reported to exist at a distance of $3\frac{1}{4}$ miles S. 7° W. from the south-east point of Rasa island. It is possible that this shoal may be connected to the 7-fathoms patch $1\frac{1}{2}$ miles to the northward of it.

A shoal (*Lat. 9° 6' N., Long. 118° 34' E.*), the existence of which was reported in 1900, is charted S.E. $\frac{1}{2}$ E. 10 miles from Rasa island.

The depths outside Rasa or Flat and Sand islands vary from 20 to 40 fathoms, mud ; in their immediate vicinity the depths are 10 and 12 fathoms, mud, decreasing gradually to the shore. Shoaler casts, such as 6 and 7 fathoms of sand and coral, here and there, may always be anticipated.

The COAST from Bivouac point, where a stream of fresh water breaks through the shingle, trends 6 miles westward to Relief point. There is a rock awash nearly midway between the two points, at half a mile from the shore.

In front of this part of the coast, at $3\frac{1}{4}$ miles from the shore, is a 3-fathoms coral patch, with depths of 15 to 16 fathoms, mud, within it, which lies with Bivouac point N. 40° E. $4\frac{1}{4}$ miles, and a 2-fathoms

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

patch lies one mile from the point with it on the same bearing. Another patch, of 5 fathoms, surrounded by deep water, lies with Bivouac point bearing N. 31° W., distant 4½ miles.

ISLAND BAY, situated between Relief point (*Lat. 9° 10' N., Long. 118° 13' E.*) and Crawford cove, 10 miles south-westward, has been only partially sounded; but sufficiently so, however, to ascertain that several shoal patches exist, and that, close in, it is hazardous for vessels to navigate.

The plain intervening, which extends across the island to Tebeyu bay, distant about 9½ miles, is cultivated in many parts, and broken up into several detached hills of conical form, at the back of which the Saddle hill of Pu lute, and Steep cliff on the Ma la nut range, are conspicuous.

From Relief point, in the north-east part of the bay, coral ground, on which there are patches of 3 feet to 12 feet, extends 1½ miles south-west.

Separation point projects from the middle of the bay, about 4 miles westward of Relief point.

Water.—There is a fresh-water rivulet at half a mile north-west of Relief point.

Ma la nut range, commencing in the conical mound Ma la nut, 1,290 feet in height, about 4 miles inland from Island bay, extends north-westward for about 7 miles, attaining an elevation of 1,630 feet.

Viewing the range end on, in a north-west or opposite direction, it assumes the form of a precipitous cliff, with steps on its south side.

Pu lute range, which is about 9 miles inland, westward of Island bay and south-westward of Ma la nut range, is 3,067 feet high, with a deep saddle to the southward, and a high and a low sharp nipple, the former 2,930 feet in height, on the slope to the northward.

Islets and dangers.—**Reef, Bessie, and Gardiner**, three low islands, upwards of a mile from each other, lie in a south-west and north-east direction in the southern part of Island bay. Reef island, the north-easternmost, has its eastern side surrounded by coral, which dries half a mile from it, with 14 fathoms near the edge.

Temple island and others, together with a number of sandbanks, lie in-shore and to the northward of these, fronting the head of the bay; the depth of water between and around them is 6 fathoms.

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 30' E.

A patch of $2\frac{1}{2}$ fathoms lies nearly midway between Reef island and Relief point, and 3 miles off-shore, with the north extreme of Reef island bearing S.W. by W. $\frac{1}{4}$ W.

A chain of four patches, with depths of from 5 to 9 fathoms, lies in a north-east and south-west direction, with the centre about $1\frac{1}{2}$ miles east-south-east of the above $2\frac{1}{2}$ -fathoms patch.

Directions.—Vessels bound to Port Separation, as the bay westward of Separation point is named, pass close eastward of Bessie island and steer northward for Separation point, keeping a good lookout for shoal patches, and anchor southward of the point in 5 or 6 fathoms.

COAST.—The coast from Crawford cove (*Lat. 9° 3' N., Long. 118° 4' E.*), which is one mile in length, with 5 fathoms water at the entrance, trends south-westward for about 11 miles to Nose point, which is low and wooded, with a small hill at the back of it, and with a reef extending off it half a mile.

On the north side of Crawford cove is the southern extremity of a coast range, and Davie hill lies nearly 2 miles southward of the cove.

Several coral patches at the depth of 6 to 12 fathoms, lie off the coast southward of Crawford cove, distant 2 to 8 miles from the shore.

A shoal, with a depth of $2\frac{1}{2}$ fathoms over it, is situated about 2 miles to the eastward of Eustasia point.

OFF-LYING DANGERS.—**Altnacraig shoal**, on which the British barque *Altnacraig* became a total wreck in 1889, lies in the position given below, or possibly some 2 or 3 miles further east.

The U.S.S. *Quiros* passed over it on 3rd January, 1903, running for a distance of $1\frac{1}{2}$ miles in shoal water, the least sounding obtained being 6 fathoms. The ship passed close to a shoal head with apparently a depth of about one fathom over it, from near which position the centre of East island bore S. 32° W., and the highest peak of Pu lute range N. 72° W. The shoal appeared to be of considerable extent.

Marabout shoal, on which the British ship *Marabout*, of 24 feet draught, grounded in 1885, is composed of coral, and considered to have a depth of about 3 fathoms; from it East island bears S. 64° W., distant about 8 miles.

East island (Komei Komeian or Tagalinog) (*Lat. 8° 53' N., Long. 118° 15' E.*) is a low coral island nearly half a mile in extent, covered with trees, the tops of which are visible about 20 miles off; it has a reef extending from the eastern side, on the

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' W.

extremity of which are some bushes half a mile from the island. It lies about $12\frac{1}{2}$ miles east-south-eastward from Eustasia point on Paláwan island. There is no anchorage near it, the depths around being upwards of 100 fathoms.

The bottom is uneven between East island and Island bay, with rocky patches here and there of 12 and 18 fathoms.

Caution.—It must be borne in mind that this sea is but imperfectly sounded and that many other dangers may exist in this locality, which is so studded with isolated rocks and shoals that extreme caution is necessary when navigating here.

COAST.—From Nose point the coast trends south-westward for $12\frac{1}{2}$ miles to Sir James Brooke point, which is low and not prominent from seaward; thence in the same direction and for a like distance to the Segyam islands. The intermediate land is a low, densely wooded plain, well populated, with several cultivated spots, and overlooked by high mountains.

The coast is slightly indented, and bold generally, as far as is known, to about half a mile, the depths when that distance from it being about 6 fathoms. Several streams of fresh water flow into the bays, and some of the points have projecting reefs, a dangerous one off Sir J. Brooke point extending about one mile in a south-south-westerly direction; a coral reef, with 7 feet over it, lies about two-thirds of a mile southward of St. John point. Three miles west-south-westward of Nose point is a reef awash at half a mile from the shore. There is said to be good protected anchorage westward of the reef extending from Sir J. Brooke point.

There is apparently a settlement at Korumi just westward of Nose point, and another at Prahu point, about 8 miles to the south-west.

LIGHT (*Lat. 8° 46' N., Long. 117° 49' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited at an elevation of 35 feet above high water from the cupola of the Government block-house on the extremity of Sir J. Brooke point.

Takbolubo, about 6 miles south-westward of Sir J. Brooke point, is a Malay settlement, and well populated. Goats, sweet potatoes, and fruit in small quantities may be obtained; and also water from a rivulet in fine weather, when there is no surf on the beach. There is anchorage in the roadstead off the settlement in a depth of 12 to 16 fathoms, stiff mud, about a mile or upwards from the shore, with Matalingahan mountain bearing N. 34° W., and Addison peak, a remarkable thumb shoulder at the end of a spur, N. 11° E. Reefs project 3 cables off both the points forming the bay.

Segyam islands are two low islands connected at half tide with the shore at the north-east point of Rocky bay, and have reefs near

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' E.

them, the largest patch lying S. 13° W. 6 cables from the westernmost island, with from 8 to 10 fathoms close-to, is reported to uncover at half tide. At about 1½ miles west-south-westward of this reef is another, lying a mile south-south-westward of Marangas.

There is anchorage in a depth of 6 fathoms, soft mud, affording shelter during the north-east monsoon, under the lee of the western Segyam island.

Mountains.—From the parallel of 9° 1' N. a central range of mountains extends in a south-westerly direction for about 20 miles, to Mantalingahan mountain. Towards the northern termination of the range there is a table hill with a sharp nipple, named Kalibugon, situated about 10 miles north-westward from Nose point, and 2½ miles northward of it is Korumi, a conical hill of less elevation.

There are several remarkable peaks, the two highest of which are Gantung, 5,868 feet high, and Lan dar gun, 5,397 feet, situated about 12½ miles westward of Nose point.

Mantalingahan mountain, 6,843 feet high, lies about 10 miles N. 73° W. from Sir J. Brooke point, and is of a reddish, barren aspect; a long smooth shoulder, terminating in three nipples, slopes gradually to the southward. View *d*, at page 100.

Foul ground.—An area of foul ground, with depths of less than 4 fathoms over it in some places, is reported to lie about 7 miles south-eastward of Sir James Brooke point, between approximately lat. 8° 35' N. and 8° 43' N., long. 117° 50' E. and 117° 59' E.

Shoal water is reported westward of this area.

Off-lying shoals.—The following shoals are reported to exist southward and south-eastward of Nose point:—

Depth 9 fathoms,	lat. 8° 46' N.,	long. 118° 0' E.
„ 7	„ „ 8° 45' N.,	„ 118° 2' E.
„ 10	„ „ 8° 46' N.,	„ 118° 7' E.
„ 6	„ „ 8° 43' N.,	„ 118° 10' E.

The last of these shoals was reported in 1905 to have less water over it; there is another reef situated about 1½ miles S. 67° W. from it. There are other shoals with depths of 5 fathoms over them in approximately lat. 8° 39' N., long. 118° 6' E., but between this position and Paláwan island the ground appears to be foul and dangerous.

SAN ANTONIO or ROCKY BAY.—From the Segyam islands (*Lat. 8° 40' N., Long. 117° 37' E.*) the coast trends west-north-westward 4 miles and then south-south-westward about 9 miles to Sarap point, forming a bay nearly 10 miles wide, backed by high hills.

Three small rivers discharge on the western shore of the bay, near the northernmost of which there is a settlement known as Bonabona;

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' E.

there is another stream close to the north-east point of the bay. The south-western shore of the bay is skirted by a reef.

Islets and dangers.—**Egg sand** is a conspicuous sandy cay situated 4 miles S. 13° W. from the western Segyam island. There is a 2-fathoms patch about $1\frac{1}{2}$ miles north-north-westward from Egg sand.

Gull sand is a large shoal, part of which dries at low water. Between Egg and Gull sands and the shore there are a number of rocks and shoal patches, some of which dry at low water; the largest of these, a mile in extent, lies 2 miles north of Pirate island and one mile from the shore. Within these sandbanks the depths decrease gradually from 22 to $4\frac{1}{2}$ fathoms, stiff mud, towards the head of the bay.

Huevo bank, about 3 miles in extent, with a depth of $4\frac{1}{2}$ to 7 fathoms, lies eastward of San Antonio bay and about 2 miles south-south-eastward of St. John point. Between Huevo bank and the shore the ground is reported to be foul.

Pirate island (*Lat. 8° 33' N., Long. 117° 32' E.*) less than 2 cables in extent, lies $1\frac{3}{4}$ miles from the Paláwan shore south-east of Mount Sarap. A reef extends three-quarters of a mile from it in an east-south-east direction; and there is a patch of coral with $2\frac{3}{4}$ fathoms lying S. 24° W., nearly a mile from the island. View *d*, at page 100.

The depths, at from 5 to 8 miles from the coast on either side of San Antonio or Rocky bay, are very irregular, varying from 7 to 30 fathoms, having apparently long ridges of coral, with 4 to 7 and 10 fathoms over them, extending almost across the bay.

Most of the shoals in this vicinity are reported to have less water on them than is shown on the chart.

Outer patch.—The outermost of the above patches that have been discovered has $3\frac{3}{4}$ fathoms on it, and lies with Pirate island bearing W. by N., distant about 6 miles.

A five-foot patch, on a coral shoal with an average depth of $3\frac{1}{2}$ fathoms, lies $2\frac{1}{2}$ miles within Outer patch in the direction of Gull sand, and N. 84° E., distant $3\frac{1}{2}$ miles from Pirate island.

Directions.—The following are reported to be good directions for entering San Antonio bay from the southward: The settlement of Bonabona should be brought to bear N. 51° W., and steered for until Egg sand cay bears S. 45° W., when the course should be altered to N. 70° W.; when the settlement bears N. 11° W. steer for it and anchor in from 6 to 10 fathoms, or farther northward in $3\frac{1}{2}$ fathoms, mud, at about one mile from the shore.

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' E.

Caution.—Vessels having no object in coming into San Antonio bay should not close this part of the coast nearer than 9 miles.

MOUNTAINS.—Aspect.—Pagoda cliff (*Lat. 8° 44' N., Long. 117° 30' E.*), 4 miles inland of San Antonio bay, is a remarkable limestone cliff, 2,016 feet in height, having a table summit with two clefts, which form pinnacles at either extremity, the southern pinnacle being the sharper; there is a small rock in the gap, conspicuous on a north-west and opposite bearing. Pagoda cliff rises immediately above a plain, which extends across the island, separating the Bulanhau and Mantalingahan ranges, being connected with the latter by a high ridge with various peaks of similar character and formation, among the most conspicuous of which are the Hat or Panalingahan; the Fin, a very sharp pinnacle; and three sharp hills under the fall of Mantalingahan. *See views c and d, at page 100.*

Bulanhau range.—To the westward of San Antonio bay and nearly in the centre of the island (which is here about 13 miles wide), is the high land of Bulanhau, which attains an elevation of about 3,500 feet. It is of a reddish aspect, and has a long smooth summit, of which it is difficult to distinguish the highest part. The northern slope has several small sharp peaks with steep shoulders and ravines, amongst the most conspicuous of which is Low-hock, generally visible even when the adjacent hills are obscured.

COAST.—From Sarap point the coast trends south-westward for about $3\frac{1}{2}$ miles to Church point, which has a reef that dries extending $1\frac{1}{4}$ miles to the south-east; thence it trends 5 miles westward to Deception point. Wooded hills lie within Church point, between which and Deception point are two bights with depths of 4 and 6 fathoms of water off the entrance points, but the western bight appears to be dry at low water.

Coral bay.—Madripore point lies 3 miles south-westward of Deception point, and the coast continues in this direction nearly 6 miles farther to Rawnsley point. This part of the coast, known as Coral bay, is merely sketched in, and no soundings have been taken near it. It is low, consisting chiefly of mangroves. It is reported that there are several visible uncharted reefs in this bay.

From Rawnsley point the coast continues south-westward for $7\frac{1}{2}$ miles to Cape Buliluyan, the southern extremity of Paláwan.

Caution.—The space within a line joining Church point to the south-eastern extreme of Bugsuk island, lying south-east of Cape Buliluyan, is encumbered with shoals, and in a south-east direction from Reef island they extend nearly 2 miles outside that line. Reef

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. $1^{\circ} 40'$ E.

island stands about $3\frac{1}{2}$ miles within the eastern edge of these dangers, some of which dry at low water.

OFF-LYING ISLAND AND DANGERS.—**Ursula island** (*Lat. $8^{\circ} 21'$ N., Long. $117^{\circ} 30'$ E.*) is situated about 10 miles southward of Church point. It is one-third of a mile in length, low, covered with trees, and surrounded by sand. The south side is steep-to, but a reef, dry at low water, extends about a mile in a north-east direction from the north part of the island.

At $2\frac{1}{2}$ miles N. 56° W. from the summit of Ursula island, is a $2\frac{1}{2}$ fathoms coral patch; and there is also another coral patch that dries N. $\frac{3}{4}$ E. 5 miles from the island, the depths between varying from 6 to 43 fathoms.

To the southward and south-eastward of Ursula, for the distance of 5 miles or more, the bottom is very irregular; a shoal, having 3 fathoms and probably less water, is situated about 3 miles southward from Ursula island, and $2\frac{3}{4}$ miles E. $\frac{1}{2}$ S. of the island there is another shoal with $2\frac{1}{2}$ fathoms; other patches of 6, 8, and 9 fathoms, coral, with deep water around them, also exist.

Other shoals than those mentioned probably exist in the neighbourhood of Ursula island.

Tides.—It is high water, full and change, at Ursula island at 11h.; springs rise $7\frac{1}{2}$ feet.

Circe shoal.—The Spanish Government schooner *Circe*, 1862, obtained a sounding of $4\frac{3}{4}$ fathoms on a bank of coral, which is placed on the charts in lat. $8^{\circ} 26'$ N., long. $117^{\circ} 56'$ E.

Wakefield shoal, on which the British ship *Wakefield* struck in 1889, has a least known depth of $3\frac{1}{2}$ fathoms, over coral and sand, it is almost $1\frac{1}{2}$ miles in length in an east-north-east and opposite direction by 2 cables in breadth, and lies with Mantalingahan mountain bearing N. 32° W., distant 31 miles.

The shoalest spot is on its south-west side, and close off there was no bottom at 90 fathoms.

It is not improbable that Wakefield and Circe shoals are identical.

Wright shoal lies with Ursula island, bearing N. 86° W., distant 9 miles; it is $1\frac{1}{4}$ miles in length east and west, half a mile in breadth, with $1\frac{3}{4}$ fathoms on its shoalest part, and depths of 47 to 70 fathoms close around.

Ginn shoal.—Mr. Ginn, Master of the American barque *Coryphene*, 1886, reported the existence of a shoal lying about S.S.E. $\frac{1}{2}$ E. from Wright shoal, distant about $7\frac{1}{2}$ miles.

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' E.

This shoal was first seen from aloft, bearing S. by E., at the distance of about 4 miles (Ursula island being just visible from the deck); soon afterwards Wright shoal was seen from aloft, bearing N.N.W., distant about $3\frac{1}{2}$ miles. Wright shoal appeared a light green colour without breakers; Ginn shoal was white in colour with the sea breaking near its centre (wind and sea moderate), and was therefore considered to have less water on it than Wright shoal; the two shoals appeared to be of about the same extent.

Argyll shoal, on which the British barque *Argyll* was totally lost in 1892, was found by the Spanish gun-vessel *Mariveles* to lie with Ursula island bearing N. 73° W., distant about 5 miles.

Cape Buliluyan (*Lat. 8° 21' N., Long. 117° 10' E.*), the southern point of Paláwan island, is a low shelving point fronted by mangroves, having on its south side depths of 4 to 8 fathoms close to, and on the eastern side—between it and the north head of Pandannan island, where the channel is 8 cables wide—28 fathoms.

For the description of the western coast of Paláwan island, the mariner is referred to the China Sea Directory, Vol. II. (Vol. IV. new series). For Balábac straits, *see* Chapter III.

General charts 2660b, 1263.

CHAPTER III.

ISLANDS AND CHANNELS BETWEEN PALÁWAN ISLAND AND BORNEO.—NORTH-EAST COAST OF BORNEO FROM SAMPANMANGIO POINT TO SIBUKO RIVER.

VARIATION IN 1911, slightly increasing.

Charts 967, 948. Var. 1° 40' E.

Between the southern part of Paláwan and the northern part of Borneo are several smaller islands, of which Pandannan, Bugsuk, Bankálan, Mantangule, the large elevated island of Balábac, and others form the northern group. Southward of this group is Balábac strait, which connects the China and Sulu or Mindoro seas. The islands of Balambangan, Banguey, and Mallawallé, with many islets and rocks, form the southern group, and lie on the south side of Balábac strait.

Chart 967, Paláwan island.

Pandannan island (*Lat. 8° 17' N., Long. 117° 10' E.*), situated southward of Cape Buliluyan, is about 6½ miles in length north-east and south-west and about 2½ miles in breadth. Its southern and western shores are fronted with coral ledges, and off the south-western extreme is a sandbank, dry at low water.

The island rises a little towards its north end, and its extreme terminates in small abrupt heads, more especially at the north-east point, off which there is a small bushy islet; from the islet a reef extends 5½ miles in a north-easterly direction, parallel with the coast of Paláwan, having a depth of from 18 to 20 fathoms close to its western edge.

There is, also, an islet on the north-west side of the island, from which a reef projects, contracting the channel between it and the south point of Paláwan to three-fourths of a mile, in which there are depths of 5 and 6 fathoms, mud.

Water.—Fresh water was found in a small opening on the south side of Pandannan island, about 1½ miles eastward of the point; but the supply was scanty and difficult to obtain, owing to the reef fronting it.

Bugsuk island, 9 miles in length north and south and 4½ miles in breadth, lies close to the east side of Pandannan, but is separated

General charts 2660b, 1263.

Chart 967, Paláwan island. Var. 1° 40' E.

from it by a channel $3\frac{1}{2}$ cables wide, in which there are depths of 10 to 18 fathoms. The southern and eastern sides of Bugsuk are fronted by a reef extending in some parts nearly 2 miles from the shore; its edge, being steep-to, is well defined.

Bowen is a round islet off the north point of Bugsuk, having a reef, partly dry at low water, extending $3\frac{1}{2}$ miles from it in an easterly direction. Farther north-eastward are numerous shoals extending towards Reef island (page 110).

Patongong islet, lying $1\frac{3}{4}$ miles westward of the north-western point of Pandannan, is nearly half a mile in length, having a reef extending $1\frac{3}{4}$ miles to the westward and north-westward.

Kanimeran, lying $1\frac{3}{4}$ miles north-north-eastward of Patongong, is a small sandy island with trees; a reef extends 8 cables north-westward of this island.

Charts 967, 948.

Bankálan island (*Lat. 8° 14' N., Long. 117° 6' E.*), lying $3\frac{1}{2}$ miles south-westward of Pandannan, on the east side of North Balábac strait, is 3 miles in length by $1\frac{3}{4}$ miles in breadth. The island is half encircled by a reef usually discernible by the breakers and the light-green water inside them, and which at the north-western extreme extends nearly $1\frac{3}{4}$ miles from the shore. The reef projects a mile from the south-western extreme of the island, and there are many isolated patches of one to 3 fathoms in the passage between it and Mantangule.

Chart 948, Balábac strait.

Mantangule and Kanabungan islands.—Mantangule island, lying $2\frac{1}{2}$ miles south-eastward of Bankálan island, is 4 miles in length east and west, and $1\frac{1}{2}$ miles in breadth.

Kanabungan island, 2 miles south-westward of Mantangule, is $1\frac{3}{4}$ miles in length north-west and south-east, and about a third of a mile in breadth.

The islands stand on the same reef of horseshoe shape which extends over a mile westward of both of them; eastward, between the islands, are depths of 4 to 7 fathoms, encumbered with shallow reefs. The east extreme of Kanabungan has a reef extending $1\frac{1}{2}$ miles.

Malinsono island is a small and high island situated on the coral spit extending $1\frac{1}{2}$ miles off the north-east point of Mantangule island. There are many shallow patches eastward of it.

Appo, Gabung, and Byan are small islands situated on the northern edge of the reef, 2 miles wide, which extends nearly 6 miles south-westward of Bugsuk island. They lie on the northern side of North channel.

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 40' E.

Anchorage.—To the eastward of Bankálan, limited on the north and south by Pandannan and Mantangule, and on the east and south-east by Bugsuk, is an expanse of water, 8 miles in length in an east and west, and $3\frac{1}{2}$ miles in a north and south direction, where in some parts anchorage sheltered from all winds may be found in depths of from 7 to 12 fathoms. The channels into it are, however, intricate, and almost impracticable for sailing vessels, being either close along the edges of the reef, or, where it is wide and inviting, between small detached coral patches, for which it is impossible to give any specific directions.

Chart 967, Paláwan island.

The best channel, if they admit of a choice, appears to be to the northward of Bankálan; between its reef and that extending from Patongong, it is $1\frac{1}{2}$ miles wide, but a 3-fathoms coral patch lying in the centre, just within the entrance, contracts it to half that distance. It should only be attempted when the reefs are distinctly visible from aloft.

The following remarks may prove of value, but they must not be absolutely relied on:—

To enter by this channel, sight the edge of Bankálan reef, which is always well defined, and keep along it at half a mile distant, until the western extreme of the island bears S. 17° W., to clear a small 3-fathoms knoll detached 3 cables from it; then close the reef immediately, to avoid the central patch, and keep 2 to 3 cables off, steering for Patawan islet off Bankálan in line with the north extreme of Malinsono. Do not approach Bankálan within 3 cables.

There is a passage in from the northward to the eastward of Kanimeran island, which under some circumstances may be preferable to, and probably be found less intricate than that just described.

Chart 948, Balábac strait.

During the south-west monsoon, anchorage may be obtained between Bankálan and Patawan (*Lat. $8^{\circ} 15' N.$, Long. $117^{\circ} 9' E.$*), in 8 or 9 fathoms, sandy bottom, with the latter island bearing about E.S.E. In the north-east monsoon, the best anchorage is to the south-eastward of Patawan, in 9 to 10 fathoms, taking care to pass between it and Bankálan, as the ground to the eastward is foul.

The only accessible channel from the south-eastward is between Mantangule and Byan island. This channel, through which a strong current usually sets, is three-fourths of a mile wide, and has depths of 11 and 12 fathoms in it, with reefs extending to the southward from either side of the entrance.

NORTH BALABAC STRAIT, formed on the north-east by Bankálan, Mantangule, and Kanabungan islands, described above, and on the south-west by Sekam, Ramos, and Kandaráman islands, is

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 40' E.

11 miles in length and about 2 miles in breadth at its narrowest part, abreast Kanabungan island, with from 19 to 50 fathoms water throughout; there is generally a strong stream in the narrow part of the strait depending on the monsoon.

Islands on south-west side.—**Sekam** (*Lat. 8° 11' N., Long. 117° 2' E.*) is a low and narrow island about one mile in length in a west-north-west and opposite direction, with trees about 100 feet high. It is situated on the west side of the entrance of North Balábac strait, and separated from Cape Disaster by Bate channel, $1\frac{3}{4}$ miles wide, with depths of 24 to 50 fathoms in the fairway, and with deep water close to the reef surrounding the island; this reef extends $1\frac{1}{2}$ miles north-westward from the western extreme of the island, with patches of coral on it which only cover at high water.

Depths of 4 to 9 fathoms extend about a mile westward and northward of the west end of the reef.

Anchorage, tolerably sheltered from south-west winds, may be obtained on the north side of Sekam island, in 19 to 20 fathoms water, sand and coral, about three-quarters of a mile from the shore, with the eastern extreme of the island bearing South; the reef to the westward affording protection from the swell.

In bad weather, a second anchor should be let go in time, as the squalls, which often succeed each other rapidly, are sometimes most violent; and, once off the bank in deep water, a sailing vessel would be awkwardly situated, as there is no other anchorage for which she could run.

Ramos island, the northern point of which is Cape Disaster, is about 4 miles in extent; it lies $2\frac{1}{2}$ miles southward of Sekam and northward of Balábac island. Cliff hill, 374 feet high, is near the southern shore of the island, $2\frac{1}{2}$ miles southward of Cape Disaster.

From Port Ciego (page 118) to Cape Disaster, the north extreme of Ramos island, and round eastward, the coast is low, with two small cliffy hills a little inland. The coast reef dries nearly a mile off at low water.

North-west shoal lies from 2 to $3\frac{1}{2}$ miles westward of Ramos island, and has as little as $1\frac{1}{2}$ fathoms over it in places.

Kandaráman island, situated on a reef very steep-to, nearly 2 miles eastward of the north extreme of Balábac island, is low and flat, $1\frac{1}{4}$ miles in length, north and south, and three-quarters of a mile in breadth; it is separated from Balábac island, and from Kaxisigan island lying off the inlet of Kandaráman, by a channel rather more than half a mile wide, with depths of 30 to 44 fathoms.

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

A reef extends two-thirds of a mile northward of Kaxisigan island, and there are patches of $1\frac{1}{2}$ to 3 fathoms for nearly a mile beyond it.

There is also a patch of 4 fathoms 2 cables S.E. of its south extreme.

Tides and tidal streams.—It is high water at Sekam island, full and change, at 11h. 24m.; springs rise $4\frac{1}{2}$ feet. The flood stream sets to the eastward, and the ebb to the westward; maximum velocity observed, $2\frac{1}{2}$ knots. For current, *see* page 116.

Directions for North Balábac strait.—If coming from the southward or westward, do not approach Balábac island nearer than 12 miles until Balábac peak bears to the southward of S. 62° E., or until Cliff hill (*Lat. $8^{\circ} 6' N.$, Long. $117^{\circ} 3' E.$*) on Ramos island bears East, when Sekam island may be steered for on an E.N.E. bearing.

If entering by Bate channel, keep a little towards Sekam island, to avoid the edge of the reef which extends about three-fourths of a mile from Cape Disaster, but on which the sea generally breaks.

From Sekam island shape course to pass midway between Kandaráman and Kanabungan, the two low islands on either side of the strait. If proceeding to the eastward, pass within $1\frac{1}{2}$ miles of the south end of Kanabungan; and if bound to the southward, to Kalandórang bay, &c., steer to pass the same distance eastward of Kandaráman, by which means the reported shoal charted from $2\frac{1}{2}$ to 3 miles from those islands, will be avoided.

If entering northward of Sekam island, steer to pass midway between it and Bankálan island on about a S. 45° E. course, avoiding the reef which stretches north-westward of Sekam, and which is usually visible; thence in the fairway between Kanabungan and Kandaráman islands, as before.

BALÁBAC ISLAND.—**General remarks.**—**Aspect.**—Balábac, lying 17 miles south-south-westward of the south-west extremity of Paláwan island and about 27 miles northward of Balam-bangan, is nearly 17 miles in length, north and south, 9 miles in breadth, and is thickly wooded. On the northern part of the island are several detached hills, the highest being elevated 750 feet (*see* view *a*, at page 134. On the southern half of the island are several ranges of high hills exhibiting great variety of outline; only a few, however, are of sufficient importance to require description. Steepfall range, about 2 miles from Cape Melville, the south point of the island, is composed of several hills in a semicircular form, and being nearly of the same elevation throughout, 850 feet, presents a table-topped appearance, whence the sides fall in a precipitous manner; hence the name. Northward of Steepfall, other ranges varying in height from 1,200 to 1,300 feet, extend to Daláwan bay; Balábac peak, situated

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

2 miles north-westward of Daláwan bay, has the greatest elevation on the island, 1,890 feet. To the northward other ranges extend as far as Kalandórang bay. See the settlement, page, 119. The island belongs to the United States of America.

Port Ciego, or Blind harbour, lies in the opening, nearly 2 miles wide, between Balábac and Ramos islands. It is, however, blocked with coral, except near the points at the entrance, where there is a narrow channel between the reefs, with 9 and 10 fathoms water. Its eastern entrance is Kandaráman inlet, which separates Balábac and Ramos islands, with depths of from 5 to 12 fathoms, but almost blocked by reefs. We have no information other than the chart shows.

Cape Melville, the south extreme of Balábac, is fronted by a reef to the distance of half a mile, and with the point to the westward has detached patches extending off to the distance of $1\frac{1}{2}$ miles.

LIGHT (*Lat. 7° 49' N., Long. 117° 0' E.*).—From a yellow octagonal masonry tower, with white lantern, 90 feet in height, with dwelling attached, situated $1\frac{1}{2}$ miles north-westward of Cape Melville, is exhibited, at an elevation of 297 feet above high water, a *white flashing* light with a period of *twenty seconds*, visible 24 miles in clear weather; the duration of the flash is *five seconds*. For arc of visibility, see Light list and charts.

WEST COAST.—Dangers.—The west coast of Balábac is fronted by numerous reefs which extend several miles off. The most important are Ada reef, Balábac Great reefs, and Gnat reef, which dry and extend from 2 to 4 miles off-shore, whilst seaward of them are the Western shoals and the South-western banks, with depths of $2\frac{1}{2}$ to 4 fathoms and possibly less, from 4 to $6\frac{3}{4}$ miles off-shore. The chart will afford better information than a written description.

Directions.—When standing towards the dangers off-lying the west coast of Balábac in the afternoon, when the sun will be astern, the outer shoals, and also the reefs will generally be seen in sufficient time to avoid them; but if the sun be ahead, the outer shoals are difficult to make out until close to them. The soundings are so variable and uncertain under depths of 30 fathoms as to afford little assistance. A good look-out is therefore of the first importance. At night, the soundings, coupled with bearings of the light, must be carefully attended to if near these dangers, and vessels should not approach to a less depth than 40 fathoms off the south-west and west parts of the island, nor get within 50 fathoms off the north-west part.

In-shore channel.—There is said to be a channel between Balábac Great reefs and the island, a cable wide in its narrowest part,

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

and with not less than $4\frac{1}{2}$ fathoms. There are many isolated dangers in it, and apparently no reason for any stranger attempting it.

West point shows out distinctly when viewed from the north-west and south-westward, and is useful for bearings when nearing the shoals.

EAST COAST.—The east coast of Balábac island is tolerably bold, with deep water close to it in most places. See view *b*, at page 134.

Plan of Kalandórang bay on 966.

Kalandórang bay, or Puerto del Principe Alfonso, situated 5 miles southward of Kandaráman inlet, is over half a mile wide between Sarmiento and Espina points, with depths of 5 to 20 fathoms. It is shallow for nearly a mile from its head and 4 cables seaward of the town, with isolated patches between the 3 and 5 fathoms contour lines. Off the town are depths of $1\frac{1}{2}$ to 2 fathoms, according to the distance. The south point of the entrance is formed by a hill 105 feet high, named Almirante Gil; the north point is mangrove, with hills a short distance inside; coral reef with shallow water beyond extends about a cable off both points, and for a greater distance off the points within on the northern shore, which is all mangrove.

LIGHT (*Lat. 8° 0' N., Long. 117° 4' E.*).—A white fixed light is exhibited from a white frame tower 33 feet high on Espina point, at an elevation of 133 feet above the sea, and visible 12 miles in clear weather.

Settlement.—The Spanish Government in 1858 erected a military station here named Balábac, on the south shore, for the purpose of developing the trade of Paláwan and other neighbouring islands; Balábac has been opened as a temporary port of entry.

Trade.—In 1908 the value of the imports amounted to \$10,055, and of exports to \$10,052. The imports consist of cotton goods and general merchandise; the principal exports are gum almaciga, rattan, beeswax, dried fish, and seashells.

In 1908, 84 foreign vessels entered, an increase of 18 over the number during 1907.

Climate.—The dry season is from November to April, and the wet season from May to October; the average temperature from one year's observations was 79° Fahr.

Supplies.—Within Espina point is a coal store and small jetty. Water is procurable at a little stream near the coal pier, but no supplies can be obtained. There is a landing pier at the town.

General charts 948, 967, 2660b, 1263.

Plan of Kalandórang bay on 966. Var. 1° 50' E.

Telephone.—A telephone has been installed between the Custom-house and Cape Melville at the southern end of the island, from which notice of vessels entering Philippine waters from Borneo or going up the west coast of the island can be transmitted.

Tides.—It is high water, full and change, at Kalandórang bay at 11h. ; springs rise 6 feet.

Directions.—Anchorage.—A steam vessel will find no difficulty in entering Kalandórang bay, guided by the plan. Approach mid-way between the entrance points, and when the lighthouse bears S.S.E. steer for the bluff westward of the town, bearing S.W. $\frac{1}{2}$ W., proceeding slowly, as the depths decrease quickly within the 10-fathoms line. Anchor when the lighthouse bears E. by S. $\frac{1}{2}$ S. in about 8 fathoms. Small vessels can go farther in on the line of bearing of the bluff. The anchorage is good with a bottom of mud, and perfectly secure in the south-west monsoon season. In the opposite season the monsoon occasionally blows into the bay with force, raising a nasty chop of a sea, so that vessels should anchor nearer the north shore in that period.

A sailing vessel from the southward should make for Daláwan bay if the wind be likely to fail, and wait a more favourable opportunity for entering Kalandórang bay; for, on account of the deep water, which is unsuitable for anchoring, if the wind should fail when within a mile or so of the port, the vessel would be swept towards the numerous dangers to the northward, there being a current setting in that direction during the south-west monsoon.

The Caimanes Estero, which discharges into the western part of the bay, is reported to offer perfectly-protected anchorage for small vessels 90 or 100 feet in length, drawing 7 to 9 feet. The channel is marked at present by stakes, and a vessel of 8 feet draught can enter at high water.

Plan of Daláwan bay on 966.

Daláwan bay (*Lat. 7° 54' N., Long. 117° 4' E.*), situated 6 miles southward of Kalandórang bay, is convenient for wooding and watering, has depths of from 2 to 15 fathoms, and affords good shelter during the south-west monsoon.

Daláwan bay will be readily recognised by the low land extending in a west-north-west direction from the beach across the island, separating the high land about Balábac peak from Transept hill, a smooth table-topped hill 1,319 feet in height, on the south side of the bay.

General charts 948, 967, 2660b, 1263.

Plan of Daláwan bay on 966. Var. 1° 50' E.

The bay is about a mile wide between the entrance points, and about three-fourths of a mile deep in a westerly direction, with anchorage in depths of 7 to 12 fathoms, mud, shoaling gradually to the sandy beach at its head. The shores of the bay are densely wooded, the entrance points on either side being fronted with mangrove. The best anchorage is about the centre of the bay in 9 fathoms, mud, nearly half a mile from the beach.

Reefs, dry at low water, project from both points at the entrance, contracting the channel to a little less than 7 cables; that on the northern side has a rock at its extremity named Buoy rock, lying South 2 cables from the shore, and which, from being generally uncovered, forms an excellent guide to enter the bay. The spit on the south side dries 1½ cables from the shore, but a rocky spit extends 3½ cables beyond this in an east-north-east direction, having in some parts only 3 feet water, with 5 and 7 fathoms close to the edge.

A reef of rocks one cable in extent, awash at low water springs, lies 2 cables eastward of the entrance of the river, with 4 fathoms, mud, near its outer edge.

A stream is situated in the south-western corner of the bay northward of the White rock; its channel is constantly shifting in consequence of freshets, but boats can enter near high water.

Tides.—It is high water, full and change, at Daláwan bay at 11h.; springs rise 5 feet.

Supplies.—About a quarter of a mile north-westward from White rock is a rivulet of good water; in the dry season the water must be obtained some distance up to be good. It is navigable for boats on ordinary occasions about a mile, where there are a few houses and some cultivated ground, where possibly goats, fowls, yams, &c., are obtainable.

In the Philippine islands Sailing Directions (U.S.) these remarks apply to a stream situated a quarter of a mile south-eastward from White rock.

Plan of Clarendon bay on 966.

Clarendon bay (Lat. 7° 49' N., Long. 117° 1' E.), situated three-quarters of a mile north-east of Cape Melville, is about 8 cables in length in a north-westerly direction, and half a mile in breadth, with depths of 4 to 6 fathoms, mud. From West point, the southern entrance point, the reef extends off a very short distance, but from the northern entrance point it projects more than 2 cables, reducing the navigable channel to barely three-quarters of a cable. Clarendon bay is of no commercial importance, and is used only by the lighthouse-tender when communicating with Cape Melville lighthouse.

General charts 948, 967, 2660b, 1263.

Plan of Clarendon bay on 966. Var. 1° 50' E.

Buoys.—A red nun buoy, No. 2, marks the edge of the spit on north-east side entering, and a black can buoy, No. 1, the edge of the western shore reef, $3\frac{1}{2}$ cables within West point.

Directions.—Approach the entrance to Clarendon bay on a N. 41° W. course, and pass close to the red buoy, leaving it on the starboard hand to avoid the reef and shoal extending off West point; having passed the buoy haul about a point to the northward, and anchor off the black buoy in from $4\frac{1}{2}$ to 5 fathoms, mud. The reef at the head of the bay should not be approached within 2 cables, as shoals are reported to lie south-eastward of it, carrying about 9 feet of water.

Chart 948, Balábac strait.

OFF-LYING DANGERS.—**Nasubatta island and reef.**—Nasubatta island, situated about $4\frac{1}{2}$ miles eastward of the entrance to Kalandórang bay, is a low cleft rock of sandstone formation, covered with trees, the tops of which are elevated 90 feet above the sea. It lies from 2 to 3 cables within the northern edge of Nasubatta reef, which is 2 miles in length, dry at low water, and steep-to.

Roughton reef (Lat. $8^\circ 1' N.$, Long. $117^\circ 13' E.$) lies to the eastward of Nasubatta reef, separated by a channel $1\frac{1}{2}$ miles in breadth with depths of nearly 100 fathoms near the centre; the reef is $2\frac{1}{2}$ miles in length in a north-east and south-westerly direction by about a mile in breadth. On the north-west side is a sand cay, covered with bushes, with Balábac peak bearing S.W. by W. $\frac{1}{4}$ W., distant nearly 11 miles. The reef is steep-to, except on its north-east side, where shallow water extends from 2 to 3 cables, and three-quarters of a mile northward of the east point is a patch of $2\frac{1}{4}$ fathoms.

NORTH CHANNEL is $4\frac{1}{2}$ miles wide between Nasubatta and Kanabungan island reefs, and 6 miles wide between Roughton reef and the reefs extending $1\frac{1}{4}$ miles from Byan and Gabung islands.

In the fairway there are depths exceeding 100 fathoms in places.

Caution.—The only difficulty likely to arise in the navigation of this channel will be caused by the tidal stream when combined with the current, which runs with considerable velocity during the strength of the monsoons, requiring a strong favourable breeze to enable sailing vessels to make headway against it. But no danger is likely to occur from this cause if they keep northward of the deep water, where there is anchorage.

A shoal, 50 to 80 feet in extent, with 5 fathoms over it, and steep-to, was reported by the master of the German vessel, *J. W.*

General charts 948, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

Gildemeister, 1885, to lie with Kanabungan island bearing N.N.W., distant about $2\frac{1}{2}$ miles. The shoal is charted where there are depths of 34 to 93 fathoms around, and in the fairway both of North channel and North Balábac strait.

NASUBATTA CHANNEL is $4\frac{3}{4}$ miles wide between Rough-ton reef and Komiran Danger bank, with depths of above 100 fathoms in the fairway. It is only necessary when navigating this channel to guard against the effects of the tidal stream, which, when combined with the current, sweeps through it in the direction of North Balábac strait with considerable velocity at times.

Komiran Danger bank, $2\frac{3}{4}$ miles in length, east-north-east and west-south-west, and a mile in breadth, includes within its limits Komiran island and two shoals.

Komiran island (*Lat. $7^{\circ} 55' N.$, Long. $117^{\circ} 13' E.$*), 80 feet high, situated S. $30^{\circ} E.$ $7\frac{1}{4}$ miles from Nasubatta island, and about 8 miles from the east coast of Balábac island, is small, wooded, and surrounded by a reef extending from one to 2 cables from the shore. Turtle at times resort here in great numbers.

Shoals.—A shoal, nearly half a mile in extent, with 2 to 3 fathoms water, lies south-westward of Komiran, its outer edge being distant nearly $1\frac{1}{4}$ miles; and another shoal, about the same size, having $2\frac{3}{4}$ to 3 fathoms, lies a little farther in an easterly direction; both are fairly steep-to. A bank, about a mile in extent, with general depths of 6 to 8 fathoms, and a patch of $4\frac{3}{4}$ fathoms on its south side, lies midway between Komiran island and the east end of Lumbukan island; there is also a small patch of 6 fathoms in the channel north-eastward of it.

KOMIRAN CHANNEL is over 3 miles wide between the dangers surrounding Komiran Danger bank and Lumbukan, with depths of 15 to 25 fathoms in the fairway on either side of the bank mentioned above. It is not recommended, as there are other and better channels, though there seems no difficulty in navigating it. Cape Melville lighthouse bearing S. $70^{\circ} W.$ apparently leads through.

Lumbukan island, about 100 feet high, is about three-quarters of a mile in length and wooded; it is surrounded by a reef, and shallow water under a depth of 3 fathoms extends $1\frac{3}{4}$ miles south-westward, and over a mile north-eastward and eastward from the island. A sand cay is on the reef at about 4 cables westward of the island.

Dangers.—At 2 to $3\frac{1}{2}$ miles north-eastward of Lumbukan, on the same bank, are the North-east shoals with depths of $1\frac{3}{4}$ to 3 fathoms. At 2 miles eastward of the island are patches of $3\frac{1}{2}$ to 5 fathoms, and

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

one mile southward is a shoal with $1\frac{1}{2}$ to 3 fathoms, known as South shoal. The island and the dangers all stand on Lumbukan Danger bank.

Chart 967, Paláwan island.

Off-lying danger.—Viola reef, a coral patch with a depth of 4 feet at low water spring tides, on which the Spanish vessel of that name struck and remained for several hours, is reported as lying about 25 miles eastward of Lumbukan Danger bank, in lat. $7^{\circ} 50' N.$, long. $117^{\circ} 41' E.$ This locality was searched by H.M.S. *Nassau* in 1872, when no indication of shoal water was found. A danger, position doubtful, is charted 4 miles further north; this was not seen by the U.S.S. *General Alava*, November, 1901, on that vessel passing $1\frac{1}{2}$ miles from its given position.

Chart 948, Balábac strait.

BALÁBAC STRAIT.—General remarks.—Balábac strait, leading from the China sea into the Mindoro or Sulu sea, lies between Balábac island on the north and Balambárgan and Banguay islands on the south.

The greater part of this strait is occupied by numerous coral dangers divided into groups, each group being distinguished by a special denomination—such as Great Danger bank, Mangsi Danger bank, &c. This arrangement distinctly defines the limits of the various channels, of which there are eight, between the dangers.

The high peak of Balábac island (*Lat $7^{\circ} 56' N.$, Long. $117^{\circ} 3' E.$*) is the most conspicuous object in the vicinity of the strait, and is visible from all parts of it. Banguay and Balábac peaks lie $N. \frac{1}{2} W.$ and $S. \frac{1}{2} E.$ from each other, $38\frac{1}{4}$ miles apart, and as most of the dangers and channels are to the eastward of that line, these peaks are of the first importance for determining the position of vessels when navigating this strait, especially for those bound eastward.

Tidal streams.—The flood stream sets to the eastward and the ebb to the westward. The strength of the stream or of the current depends greatly on the prevailing winds. The greatest velocity observed was $2\frac{1}{2}$ knots.

In the months of October and November, after a succession of westerly winds, the current was found to set constantly to the eastward, slackening only on the ebb tide; while in July, after a continuance of unusually fine weather with light east and south-east winds, it set with the same strength, viz., from three-quarters to $2\frac{1}{2}$ knots in the opposite direction. The mean velocity observed for 13 consecutive hours was $1\frac{3}{4}$ knots.

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

LUMBUKAN CHANNEL.—Lumbukan channel, lying between Lumbukan Danger bank on the north and Ellis shoal and Simanáhan reef on the south, is from 4 to 5 miles wide, with depths of 13 to 28 fathoms, and apparently free from danger.

A bank about three-quarters of a mile in length east and west, and with depths of $7\frac{1}{2}$ to 10 fathoms over it, is situated $2\frac{3}{4}$ miles to the southward of Lumbukan island, from its centre, the eastern extreme of Lumbukan bears N. 22° E., distant 3 miles, and Cape Melville N. 83° W. Doorly patches divide the channel at its eastern end, but the least known depth over them is 6 fathoms, and they are steep-to.

Directions.—If bound to the north-eastward, Lumbukan is a good channel to use, on account of its width, and to ensure its safe navigation it will be only necessary to pass about $3\frac{1}{2}$ miles southward of Lumbukan island; bearings of Cape Melville lighthouse, Balábac peak, and Lumbukan will afford the means of fixing the vessel's position.

Ellis shoal, situated $6\frac{1}{4}$ miles south-south-westward of Lumbukan island, and in the western approach to Lumbukan and Simanáhan channels, is $2\frac{1}{2}$ miles in length and half a mile in breadth, and is composed of coral; it has a least depth of $2\frac{3}{4}$ fathoms near its centre, from which Balábac peak bears N. 32° W., distant 14 miles.

Simanáhan reef, situated $7\frac{1}{4}$ miles S. 50° E. from the east end of Lumbukan island, is situated near the centre of a coral bank 5 miles in length by three-quarters of a mile in breadth. The reef, dry at low water to the extent of about $1\frac{1}{4}$ miles, has a sandbank near its centre which is just below the surface at high water; this serves, even when covered, from the light colour of the water over it, to point out the position of the reef from some distance. The shallow part of the bank, under a depth of 3 fathoms, encompassing the reef, is about 3 miles in extent.

SIMANAHAN CHANNEL (*Lat. $7^{\circ} 44' N.$, Long. $117^{\circ} 20' E.$*), between Simanáhan reef and Great Danger bank, is apparently free from danger with depths of 23 to 30 fathoms; all that is necessary for its safe navigation is to pass about three-quarters of a mile to the southward of the reef on an east or west course, avoiding Ellis shoal, but occasion can seldom arise to render this a convenient channel by which to proceed.

GREAT DANGER BANK comprises many reefs, amongst which no vessel should venture. It is 14 miles in length in a west-north-west and opposite direction, and $7\frac{1}{2}$ miles in breadth at its north-west end, gradually decreasing towards its south-east extreme. On the south-east reef is a sand cay.

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

North patches, two in number, lie near the north edge of the bank, with $3\frac{1}{2}$ fathoms least water.

N.W. shoals, situated at the north-west extreme of the bank, occupy a space $4\frac{1}{2}$ miles in length, with depths of $1\frac{1}{2}$ to 3 fathoms.

Middle shoals are a cluster of coral patches forming the middle of Great Danger bank; they cover a space of about 6 miles east and west, with as little as 2 fathoms in two or more places.

Sand cay (*Lat. 7° 35' N., Long. 117° 23' E.*), the only conspicuous object marking any part of the bank, stands at the southern side of it, about 4 miles westward of the south-east extreme. This cay is situated near the centre of a narrow coral reef, 3 miles in length, from each end of which shallow water (under 3 fathoms) extends about half a mile, with patches of 3 to 5 fathoms beyond, and in a northerly direction also, nearly as far as the Middle shoals.

S.E. shoals comprise several coral patches situated near the south-east extreme of the bank, extending over a space about 2 miles in length with depths of $1\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, the shallowest being S. 82° E., distant 3 miles from the sand cay.

Chart 967, Paláwan island.

Off-lying shoal.—Borneo bank.—In 1907 the s.s. *Borneo* whilst on a voyage from Sandakan to Hong Kong, passed over a patch of discoloured water, the coral bottom being plainly visible. The ship was stopped, and depths of from 7 to 15 fathoms were obtained. It is situated about 15 miles east-north-eastward from the S.E. shoals of Great Danger bank, in the eastern approach to Balábac strait in approximately lat. 7° 40' N., long. 117° 38' E. This shoal was not examined; there may therefore be less water over it.

Chart 948, Balábac strait.

MIDDLE CHANNEL, separating Great Danger bank from Mangsi Danger bank, is a mile wide at its narrowest part, with depths of 16 to 34 fathoms in the fairway.

Ray bank, of sand and coral, is a mile in length, half a mile in breadth, and steep-to, with a least known depth of 4 fathoms near its centre; it lies on the north side of the approach to Middle channel and 6 miles westward of the north-west shoals on Great Danger bank, with Balábac peak bearing N. 21° W., distant $16\frac{1}{2}$ miles from the 4-fathoms spot.

Directions.—Middle channel lies out of the ordinary route of vessels, but it may be used if necessary. Coming from the south-westward, Balábac peak should not be brought westward of N. 23° W. until Salingsingan island on Mangsi Danger bank bears S. 73° E. to

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

clear Loxdale shoal (*see below*). Steer for Salingsingan island, bearing E.S.E. until about 5 miles from it, when an E. by S. course will lead a mile northward of that island and about $1\frac{1}{2}$ miles southward of the sand cay on Great Danger bank. Bearings of the Mangsi islands and of the sand cay will keep a vessel in the fairway.

MANGSI DANGER BANK, situated southward of Great Danger bank, from which it is separated by Middle channel, includes within its limits the Mangsi and Salingsingan islands, with the extensive dangers adjacent; also Loxdale, Jessie, and many smaller shoals. This bank is 10 miles in length east and west, and 4 miles in breadth at the eastern end, tapering to the opposite extreme.

Loxdale shoal, at the west end of the bank, is formed of coral, nearly $1\frac{3}{4}$ miles in length, and from 3 to 5 cables in breadth, with $2\frac{1}{4}$ to 3 fathoms water, and fairly steep-to. From the west end of this danger Balábac peak bears N. 26° W., and Salingsingan S. 87° E., distant 5 miles.

Salingsingan island (*Lat. $7^{\circ} 34'$ N., Long. $117^{\circ} 18'$ E.*), situated 5 miles S. 71° W. of sand cay on Great Danger bank, is composed of coral and sand covered with trees; it is rather more than half a mile in length east-south-east and west-north-west, and one cable in breadth. Shoals nearly awash in parts stretch off three-quarters of a mile eastward, and $1\frac{3}{4}$ miles westward, from the island, the breadth of the latter being nearly a mile.

Jessie shoal, with 6 feet least water, lying $2\frac{1}{2}$ miles S. 67° E. from Salingsingan island, is $1\frac{1}{2}$ miles in length and half a mile in breadth. This danger is situated at the east part of the bank, and shallow patches outline its extremes.

North Mangsi island, situated 2 miles southward of Salingsingan island, is covered with trees, which rise to an apex near the centre 130 feet above high water. The island is three-quarters of a mile in length, and from its east end reefs and shoals extend—beyond those projecting from South Mangsi—for a distance of $2\frac{1}{4}$ miles, and some patches of 4 to 7 fathoms three-quarters of a mile farther in an easterly direction; from the west end a line of reefs extends in a west-north-west direction to the distance of $3\frac{1}{2}$ miles.

South Mangsi island, covered with trees, is round shaped, about half a mile in diameter, and stands upon a reef which extends from it one mile eastward, 6 cables westward, and to a less distance in other directions. It lies about 6 cables south-eastward of North Mangsi island.

MANGSI CHANNEL, separating Mangsi Great reef from Mangsi Danger bank, is one mile wide at its narrowest part, where the

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

depths are irregular; it is deep- throughout, having from 18 to 33 fathoms in the fairway. The reefs on the north side of this channel are steep-to; Mangsi Great reef forming the south side is less so, and from the northern side of the east point of the reef, shoal water extends in the direction of South Mangsi island to the distance of half a mile.

Directions.—Navigators will rarely have occasion to use this channel, but in case of necessity the following directions may be of assistance; with a proper lookout, no difficulty will be found in passing safely through. Coming from the westward, and having sighted the Mangsi islands, bring the centre of South Mangsi island to bear E. by S. and steer for it; when the west end of North Mangsi bears E.N.E. steer S.E., passing midway between the islands and Great reef.

Dangers on northern side of Main channel.—**Mangsi Great reef** lies south-westward of Mangsi Danger bank, separated from it by Mangsi channel (*see above*), and its southern edge is situated $4\frac{1}{2}$ miles northward of North Guhuan; the reef is 5 miles in length in an east and west direction by $2\frac{3}{4}$ miles in breadth, and is steep-to on its southern side. It is nearly everywhere covered at high water, but a sand cay upon the eastern part is generally visible from aloft when near the edge. At low water the reef presents a vast expanse of coral and sand, with lagoons here and there.

From the west end of the reef shallow water, under 10 fathoms, extends about 2 miles in a W.S.W. direction, with irregular depths; the least known is 4 fathoms, but the locality should be avoided. Banguay peak bearing southward of S.S.W., leads westward of it. For North and South Mangsi islands, *see page 127*.

The MAIN CHANNEL (*Lat. 7° 26' N., Long. 117° 12' E.*) through Balábac strait is limited to the northward by Mangsi Great reef, the southern part of which is $1\frac{1}{2}$ miles distant from the edge of the bank on the Banguay side, and to the southward by the danger line encompassing the reefs and shoals lying off the north and north-east coasts of Banguay island (*see page 134*). The depths in the channel are not regular, varying from 13 to 22 fathoms, the deepest water being rather nearer the reef than the middle of the channel. For Directions, *see page 135*.

Balambangan and Banguay islands and the shoals bordering the north and east sides of Banguay, all of which lie on the southern side of Main channel, will now be described.

BALAMBANGAN ISLAND.—**General remarks.**—This island, situated 27 miles southward of Balábac island and

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

11½ miles north-eastward from the north extreme of Borneo, is of irregular shape, 13½ miles in length in a north-east and south-west direction, with an extreme breadth of about 4 miles. The composition of the elevations of Balambangan island varies between limestone, basalt, trap, and sandstone. All the rocks exhibit traces of violent convulsion.

The northern portion of the island is flat, but thickly covered with high trees.

The southern portion of this island presents a range of hills, the highest being 440 feet; there are also other elevations, one of which, Thumb peak, 314 feet high, near the south-west extreme of the island, is conspicuous; these elevations are terminated on the coastline by abrupt cliffs. On the east side of Balambangan island are two inlets known as North and South harbours, both affording good drinking water.

Fuel may be obtained at any part of this island, and is similar in quality to the woods of Borneo grown on hard soil.

Balambangan island is a British possession.

DANGERS.—Reefs and shoals extend more than three-quarters of a mile from Siagut point, and a 3-fathoms patch lies north-north-west, nearly 1½ miles from it; vessels should, therefore, when rounding Siagut point give it a berth of 2 miles, or not come into less than 9 fathoms water.

Siagut shoal, lying 2 miles westward from Siagut point, the north extreme of Balambangan island, is a detached coral bank 1½ miles in length, with one head awash at low water and with less than 6 feet water over other parts of it.

The large bay south-westward of Siagut point has less than 3 fathoms water extending nearly 1½ miles from the shore, and southward of Buttun point the reef extends off nearly three-quarters of a mile; by keeping in depths of not less than 14 fathoms all these dangers will be avoided.

Kalutan point (*Lat. 7° 12' N., Long. 116° 52' E.*), the south extreme of Balambangan island, is fronted by several islets and rocks extending three-quarters of a mile in a south-easterly direction. At half a mile eastward of these is a coral patch with 3 fathoms water, with the point bearing W. by N. ¼ N., distant one mile.

Kalutan island.—About three-quarters of a mile north-west of Kalutan point and half a mile from the shore is the small round island of Kalutan, 278 feet high, having a reef projecting nearly half a mile from its west side.

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

East coast.—The whole of the east coast of Balambangan is fronted by a coral reef outside which are detached dry patches here and there, but the 3-fathoms edge embracing these is, for the most part, distant half a mile from the shore. At $1\frac{1}{2}$ miles south-eastward of Siagut point, and separated from the shore reef by a narrow passage, lies a coral shoal more than half a mile in diameter, having less than 6 feet water over some parts of it; eastward of this danger, in the channel between it and the reef surrounding Tiga islet, is a shoal of $3\frac{1}{2}$ fathoms and another of $2\frac{1}{2}$ fathoms; caution is therefore necessary when passing through that channel.

The shoals along the south-east coast are not easily discovered unless the sun be shining behind the observer; southward of Sapiroak point the shore reef extends to the distance of $1\frac{1}{2}$ miles.

Plan of North harbour on 966.

North harbour (Lat. $7^{\circ} 17' N.$, Long. $117^{\circ} 1' E.$), or Luk Barábok Barábok, offers greater convenience for anchorage than the South harbour, and is of much easier approach, the shoals being better defined. There are from 10 to 13 fathoms in the entrance, and from 7 to 11 fathoms in the anchorage within; *see* Anchorage.

It is not advisable to enter this harbour, however, unless the reefs are visible from aloft.

Directions.—From the south-westward, keep Kalutan point bearing westward of W. by S., to pass southward of Half Channel patch lying 2 miles S.E. by E. from Sapiroak point, which has only 3 feet water and breaks at times. When Manyangit point, on Banguay island, bears N.N.E. steer for it until Battang point bears about N. 40° W.; then steer to pass between the latter point and the reef awash nearly a mile S.W. by S. of it, looking out to avoid a $1\frac{1}{2}$ -fathoms knoll lying half a mile from the shore, just within Battang point. A reef awash lies about $3\frac{1}{2}$ cables north-west of this knoll.

Anchorage may be obtained in a depth of 10 fathoms, with the centre of the reef awash last mentioned in line with Battang point, and Sapiroak point bearing S.S.W.

The head of the harbour is known as Lung bay, and has depths of 5 to 7 fathoms between the reefs fringing its shores.

Water.—It was on the southern point of North harbour that the English establishment (abandoned in 1803) was situated. Two streams flow into the sea, one on each side of the ruins. The westernmost will, it is stated, even in the dry season, furnish about 15 tons of water during the day.

General charts 948, 287, 967, 2660b, 1263.

Plan of South harbour on 966. Var. 1° 50' E.

South harbour (*Lat. 7° 13' N., Long. 116° 54' E.*), situated on the east side of the south extreme of Balambangan, is fronted by isolated shoals to the distance of about 2 miles with reefs on either side, for which *see* the plan. The channel abreast Raha, the south point of entrance, is a quarter of a mile wide between the reefs, with a depth of 7 fathoms.

Directions.—To enter this harbour requires close attention to the following directions, as well as the lead and look-out, and it is not advisable to enter unless the reefs are visible from aloft. From the south-westward, having given Kalutan point a berth of at least a mile, haul nearer the shore, bringing Cone islet, the outer islet off Kalutan, to bear W. by S. $\frac{3}{4}$ S. well open of the islets off Observatory point, which leads southward of the reefs off Raha point. When Raha point bears N.W. $\frac{1}{4}$ N., haul up North, passing between Raha reef (the edge of which will be seen from aloft and probably marked by breakers), and the detached reefs to the eastward, looking out to avoid the 6-foot rocky patch lying $2\frac{1}{2}$ cables eastward of Raha reef; round Raha reef at a prudent distance and haul in about W. by S. for the anchorage in a depth of 7 fathoms, in the fairway off the watering place, about $1\frac{1}{2}$ cables from the southern shore.

Water.—Fresh water will be found on the south shore, about a quarter of a mile within Raha point. The reef prevents access until half flood.

Tides.—It is high water, full and change, in South harbour at 10h. 0m.; springs rise 7 feet.

Chart 948, Balábar strait.

BANGUEY WEST CHANNEL separates Balambangan and Banguey islands, and has a least breadth of $2\frac{1}{4}$ miles between Battang and Manyangit points.

The southern portion is deep, with Half Channel patch previously referred to nearly in the fairway, but with a channel $2\frac{1}{2}$ miles wide eastward of it.

The northern entrance, between Siagut and Samarang points, about $8\frac{3}{4}$ miles apart, is obstructed by Tiga islet and its reef, and by Rifleman rock and other patches. The channel between Rifleman rock and Tiga is navigable, and has depths of 6 to 7 fathoms in its fairway, but it would not be safe to reckon on more than 5 fathoms unless the channel were thoroughly buoyed; the rock is buoyed, and there is a beacon marking the south-eastern edge of Tiga islet reefs, but these marks must not be depended on. The channel along the Banguey shore seems also good, if buoyed. The channel westward of Tiga is narrower and more obstructed. They should only be navigated when the dangers are discernible.

General charts 948, 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

DANGERS.—**Tiga islet** (*Lat. 7° 21' N., Long. 117° 3' E.*), situated in the northern entrance of Banguey west channel, is low and covered with trees; it is a little over half a mile in length, less than a quarter of a mile in breadth, and is surrounded by reefs fairly steep-to, extending about a mile in a northerly and south-easterly and about three-quarters of a mile in other directions.

Beacon.—The south-east extremity of the reef is marked by a black iron tripod beacon, situated S. 51° E., distant about one mile from the south point of Tiga islet.

The shoal westward of Tiga islet, and south-eastward of Siagut point, has been referred to. Patches of 2½ and 3½ fathoms lie between that shoal and Tiga islet reef, in the fairway.

Rifleman rock, a small coral patch with 1½ fathoms water over it, and 5 fathoms close-to, lies in the fairway between Tiga islet reef and the Banguey coast dangers, with the south-west end of Tiga islet bearing W. ¾ N., distant 2 miles. Westward of the rock there are depths of 6 and 7 fathoms in the fairway.

Buoy.—A black buoy surmounted by a white ball has been placed on Rifleman rock by the B. N. Borneo Company, but it is not to be depended on.

About midway between Rifleman rock and the north-west coast of Banguey are patches of 2½ and 3 fathoms, on a bank about 2½ miles in extent north-east and south-west within the 5-fathoms limit, and with a depth of 6 to 7 fathoms in the channel between them and the shore.

Labuan rock, with 1½ fathoms water over it, lies in the fairway about 2 miles S. 36° W. from Rifleman rock, and the same distance S. 22° E. from the southern extreme of Tiga islet.

Samarang point, on Banguey island, is the eastern entrance point of the northern end of Banguey West channel; it has a reef extending nearly three-quarters of a mile north-west of it, on which there is a sand cay about 2 cables within its extreme. Nearly 2 miles south-westward there is an islet on the reef fronting the shore.

The coast southward is foul only to about 3 cables, except in one or two places, for which *see* the chart.

Directions.—The channel between Rifleman rock and Tiga islet reef is available for vessels of moderate draught. If the buoy is in position on Rifleman rock there will be no difficulty. Coming from the northward, Battang point, bearing S. 38° W., is apparently a

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

good mark, leading between Rifleman rock and the beacon on Tiga islet reef and westward of Labuan rock; when Manyangit point bears S.E., or Banguey peak S. 72° E., course should be altered to pass half a mile westward of Manyangit point; thence along the Banguey side at the distance of one to 1½ miles until southward of Half Channel patch, when course may be shaped to the westward as requisite. Banguey peak should not be brought northward of N.N.E. if near Molleangan island reefs.

Tides.—It is high water, full and change, in Banguey West channel at 10h.; springs rise 6 to 8 feet.

BANGUEY ISLAND, the north-western extreme of which lies 2¼ miles eastward of Balambangan, is 19½ miles in length in a north-east and south-west direction, and about 12 miles in breadth. The island is surrounded by a fringing reef, the south-east coast being faced by small islands, having deep water channels between, and large concealed channels behind, which formerly served as the principal rendezvous and hiding places for pirates. These small islands form part of the northern limit, and are included in the description of Banguey South channel. The west coast is included in the description of Banguey West channel, and the north coast in that of Balábac strait. Off-lying for several miles the north-east and east coasts of Banguey are numerous islands, islets, and dangers, as will be seen on the charts. Banguey is a British possession.

Aspect.—There are several ranges, also some detached hills, on Banguey; the highest, Banguey peak, 1,876 feet high, is at the north-west end of the island, and shows up as a very conspicuous object for more than 30 miles around. Viewed on a north-easterly or opposite line of bearing, the apex appears as a nipple, but as this line of bearing is departed from, the nipple shape becomes less apparent, and the summit assumes a rounded form. A range of hills extends to the eastward for a distance of 6 miles, with East hill at the extreme, elevated 1,076 feet; thence some smaller ranges lie in a northerly direction, and terminate near the coast in North hill, 742 feet high. About 1¼ miles south-eastward of Banguey peak is a conspicuous hill 1,480 feet in height. The island is thickly wooded.

North and N.E. coasts of Banguey.—Samarang point (*Lat. 7° 21' N., Long. 117° 9' E.*) is described with Banguey West channel on page 132.

Between Samarang point and the north point of Banguey the coast recedes, forming two bays, each having a small stream running into it; the points and the sides of the western bay are fringed with coral extending one to 2 cables from the shore, but the head of it is a coral and sand beach; vessels may anchor in the entrance of the bay in

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

4 fathoms. The eastern bay, with the exception of a narrow boat passage, is blocked with coral, upon the outer part of which is a small islet.

Main channel, Balábac strait (continued from page 128).

DANGERS on southern side.—The principal islands and dangers fronting the north and east coasts of Banguey, and bordering the south side of the Main channel, are as follows:—The limits of these dangers, and the greater part of the reefs and shoals in the vicinity of Balábac strait, are depicted on the chart by a pecked line, within which vessels should not pass.

North Guhuan islet (*Lat. 7° 23' N., Long. 117° 14' E.*) is situated on a reef three-quarters of a mile in extent, nearly one mile off the north point of Banguey, and 5 miles eastward of Samarang point; there are no off-shore dangers westward of it. From North Guhuan a bank with less than 3 fathoms extends eastward parallel to the shore for about 4 miles, on which are two sand cays and reefs dry at low water.

Louisa shoal, composed of coral, with $1\frac{1}{2}$ fathoms water, is nearly a mile in length; from its north extreme North Guhuan bears S. 13° W., distant about $1\frac{1}{2}$ miles. At about $1\frac{1}{2}$ miles northward of Louisa shoal are two patches of 5 fathoms.

Clearing mark.—Manyangit point, well open of Samarang point, leads northward of Louisa shoal.

Maggie reef, situated about 3 miles eastward of Louisa shoal, is about one mile in length, with a coral patch that dries, $2\frac{1}{2}$ cables in extent on its northern side, and many rocks just below water. At about half a mile northward of a line joining the northern edges of Louisa shoal and Maggie reef are two $3\frac{1}{2}$ -fathom patches.

Black Watch rock, on which the British barque *Black Watch* is reported to have struck, in 1878, lies just within the danger line depicted on the chart, 2 miles north of Maggie reef.

From the position of this rock, as given by the master of the *Black Watch*, North Mangsi island is well open westward of South Mangsi island, bearing N. 8° E., and the cay on Banguey Outer north-east reefs, S. 55° E. At half a mile eastward of the assigned position of the rock the depth is $5\frac{1}{2}$ fathoms.

From the irregularity of the soundings near this suspected locality it is possible that coral heads may exist other than those shown on the chart.

East Guhuan islet, about a quarter of a mile in extent, stands on the west side of a coral reef, $1\frac{1}{2}$ miles in length, the northern part

General charts 967, 2660b, 1263.

(a)

Cape Disaster.

Balibac peak,
S. 4° E., 14 m.

Balábac Island from Northward.

(b)

S. 81° W. Transcept hill.

Deliuan bay,
N. 85° W.

Balibac peak,
N. 73° W., 9½ m.

East Side of Balábac Island.

N. 44° W.

(c)

Torungplok I.

Bongaya Mt. Kini Balu.
river.

Western Shore of Labuk Bay.

Tanjong Niug
(Cassarinae).

Chart 948, Balábac strait. Var. 1° 50' E.

of which dries. About a mile north-north-westward of East Guhuan islet lies a $1\frac{1}{2}$ -fathoms patch.

Banguay Outer N.E. reefs are a cluster of reefs separated from Maggie reef and East Guhuan islet by a channel, one mile wide, with depths of 7 to 9 fathoms; these reefs are $3\frac{1}{2}$ miles in length in a north-west and south-east direction, and a little over one mile in breadth, with a large central portion dry at low water. Upon the north-west end of the reefs is a sand cay, which is useful for pointing out the locality of these dangers, which lie 6 miles from the shore. Close to the edges of these reefs there are depths of 6 to 9 fathoms.

The west extreme of North Mangsi island, in line with the west extreme of South Mangsi, N. 35° W., or the latter to the westward of that bearing, leads eastward of these reefs.

Off-lying shoals.—A shoal with a depth of about 2 fathoms over it is situated in the eastern approach to Balábac strait, $12\frac{3}{4}$ miles eastward from East Guhuan islet, or in approximately lat. $7^{\circ} 22\frac{1}{4}'$ N., long. $117^{\circ} 32'$ E. This neighbourhood has not been completely examined. *See also* page 155.

A patch (Lat. $7^{\circ} 23'$ N., Long. $117^{\circ} 36'$ E.) with a depth of 4 fathoms over it is situated $18\frac{1}{2}$ miles N. 67° E. from the summit of Latoan island.

Kestrel rock.—H.M.S. *Kestrel* passed over a patch in the east entrance of Main channel, with Banguay peak bearing S. 59° W. and the south-west extreme of South Mangsi island N. 66° W. A depth of $3\frac{1}{2}$ fathoms has been obtained over this rock.

Soundings of 8 fathoms were obtained by H.M.S. *Comus*, 1882, on a shoal about one mile south of Kestrel rock; caution should be exercised when in this neighbourhood.

Chart 967, Paláwan island.

Rock.—A rock, awash (position doubtful), was reported in 1899 to lie 8 miles eastward of Kestrel rock; its charted position is lat. $7^{\circ} 29'$ N., long. $117^{\circ} 30'$ E.

Chart 948, Balábac strait.

DIRECTIONS for Main channel.—Vessels coming from the south-westward, and bound through Balábac strait, during the north-east monsoon, will find Main channel the most convenient. When approaching the north end of Balambárgan island, do not bring Buttun point to the westward of S. 39° W., nor come into less than 14 fathoms, until the north hill on Banguay bears S. 73° E., which latter mark leads over one mile outside the dangers off Siagut point, and of those extending north of Tiga islet.

From a position about 3 miles northward of Siagut point, a N. 80° E. course should carry a vessel about three-quarters of a mile southward of Mangsi Great reef.

General charts 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

The light green colour of the water over Great Mangsi reef will, even at high tide, enable a good lookout aloft to make out the edge sufficiently far off to permit of a vessel being guided past it at a safe distance. From about three-quarters of a mile off its south end, steer to pass about 2 miles southward of South Mangsi island, and the same distance northward of Kestrel rock, when the course may be altered to East, or as necessary according to destination (*see* rock mentioned on page 135). North hill will be found useful for bearings.

If proceeding to Sandakan, after passing the space with irregular soundings extending eastward from Banguey island to the distance of about 30 miles (*see* page 155), steer towards Muligi islands so as to make them on a S.E. bearing.

Coming from the Sulu sea, the Mangsi islands should be made bearing about West, thence steer to pass 2 miles southward of them; when the islands are abeam a course about W.S.W. will lead to the entrance of Main channel.

BANGUEY EAST COAST and DANGERS.—The east coast of Banguey is fronted by dangers which extend off several miles; they consist for the most part of extensive reefs, dry at low water, separated from each other by narrow channels, and of which the outer ones only will be described.

Kahamkamman (*Lat. 7° 21' N., Long. 117° 21' E.*) is a small islet 2 miles south-eastward of East Guhuan, on the north-west end of a coral reef about one mile in extent; the part surrounding the islet dries at low water.

Samson patches, three in number, have $3\frac{1}{2}$ to 4 fathoms on them; they lie eastward of Kahamkamman near the edge of the danger line marked on the chart; from the easternmost patch Kahamkamman bears N. 86° W. 3 miles. A small $4\frac{1}{2}$ -fathoms coral patch lies about 2 miles S. 54° E. from the eastern Samson patch.

May Williams shoal, situated from $1\frac{1}{4}$ to 2 miles S.E. by S. from Kahamkamman island, is one mile in length with a least depth of 2 fathoms and steep-to at a short distance.

Latoan island, situated about $4\frac{1}{2}$ miles southward of Kahamkamman island, is an oval-shaped island, one mile in extent, the trees upon it rising to an apex near the centre. It is situated at the south-west part of a dry reef, which extends $2\frac{3}{4}$ miles eastward, and $1\frac{1}{2}$ miles northward of it.

Outer Latoan patch is the easternmost of three isolated patches which lie off the north-east edge of Latoan island reef; it has a rock a few feet under water near its eastern edge, from which Latoan apex bears S. 63° W., distant $3\frac{3}{4}$ miles. On the middle isolated patch, about a

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

mile west-north-westward of the rock just mentioned, are some rocks, 12 feet above low water.

East Banguay patches are two small coral shoals with 2 and $2\frac{3}{4}$ fathoms, lying one mile and $1\frac{1}{4}$ miles respectively off the north-eastern extreme of the Bankawan reefs; from the outer one, Latoan summit bears N. 69° W. distant nearly 4 miles.

Bankawan island (*Lat. $7^\circ 14'$ N., Long. $117^\circ 19'$ E.*), situated about three-quarters of a mile from the east coast of Banguay, is an irregular shaped flat island, $2\frac{3}{4}$ miles in length north and south and $1\frac{1}{2}$ miles in breadth. Close to its east side is an island, with an islet off its north-east point; and two-thirds of a mile south-eastward of it, a small round island, from which a narrow tongue of sand projects three-quarters of a mile in a south-easterly direction.

Bankawan reefs extend eastward to a distance of $3\frac{1}{4}$ miles from the northern point of Bankawan island, and for 3 miles abreast the southern part. Abreast the centre of these reefs is an isolated reef, $1\frac{1}{4}$ miles in length, the outer edge of which is $3\frac{3}{4}$ miles distant from Bankawan. From the south point of Bankawan numerous small reefs extend for about 2 miles, which, with the reef extending half a mile south-eastward of the tongue of sand, the Bankawan reefs, and the isolated reef just mentioned, form the northern limit of Bankawan channel.

Boats only can pass between the various reefs comprising the Bankawan and Latoan islands group, but between them and the reef fronting the Banguay coast there is a deep water channel through which it is possible for small vessels to pass, although near the west point of Bankawan the channel is narrowed to little more than a cable by a small reef in the middle.

The space eastward of the reef herein mentioned has not been completely examined, so that shallow patches not charted may exist.

BANGUEY SOUTH CHANNEL, leading from the China into the Sulu sea, is somewhat intricate, and requires careful navigation, being for the greater part of its length bordered by dangers, and with others near the fairway. The western entrance, about $1\frac{3}{4}$ miles wide, lies between Molleangan islands and Outer shoal off-lying the coasts of Banguay and Borneo respectively.

The northern limits of the channel are, the islands which lie close to and appear to be part of the southern shore of Banguay, Carrington reefs, and South-east Banguay dangers. See pages 138-141.

The southern limits of the channel are formed by the North-west and North Borneo dangers, South channel dangers, the reefs off the northern part of Mallawallé, Mallawallé Eastern dangers, and Fairway shoal. See pages 151-154.

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

A careful lookout aloft and with the sun in a favourable position is necessary for navigating the channel in safety. For directions, *see* page 154.

Balábac Main channel is considered much safer than any of the Banguey or Mallawallé channels, and is therefore preferable.

SOUTH COAST of BANGUEY ISLAND.—**Molleangan island** (*Lat. 7° 5' N., Long. 117° 3' E.*), 466 feet high, situated $1\frac{1}{4}$ miles south-westward of the south point of Banguey, is $1\frac{1}{4}$ miles in length east and west and three-quarters of a mile in breadth, with reefs and rocks above water extending three-quarters of a mile in a north-west, west, and south-westerly direction; the south-east and north-east sides of this island are steep-to. Several reefs with rocks above and below water lie nearly midway between Molleangan and Banguey.

At one mile south-west of Molleangan, lies Little Molleangan island, from which dangers extend a third of a mile eastward, and three-quarters of a mile westward, with depths of 13 to 17 fathoms close to.

Patanunam island, three-quarters of a mile eastward of the south point of Banguey, is more than half a mile in extent, and 428 feet high; the summit is a useful object for determining a vessel's position when passing through Banguey South channel. The island is fringed by a coral reef projecting 2 cables from its south-west end, whilst off the north-east end a detached narrow reef extends nearly a mile in that direction.

Plan 1220, Mitford harbour.

Pagassan island, hilly in character, is about $2\frac{1}{2}$ miles in length east-north-east and west-south-west, and about $1\frac{1}{2}$ miles in breadth; it is fringed by a reef which projects 3 cables from the southern part, with a rock nearly awash at a cable beyond. Westward of this rock there are patches of 4 and 5 fathoms, the outer and most distant of which is situated one mile S. 73° W. from it. An island $1\frac{1}{4}$ miles in length east and west and about 4 cables wide lies westward of Pagassan island, separated from it by a narrow channel named Middle entrance. A reef extends from one to $5\frac{1}{2}$ cables from the eastern side of Pagassan, forming the western side of East entrance.

Lampassan island, densely wooded, lies three-quarters of a mile eastward of Pagassan, and is about 3 miles in length; from its southern and eastern points coral spits, dry at low water, extend to the distance of three-quarters of a mile, and a reef extends from one to 2 cables from its western side, forming the eastern side of East entrance.

General charts 948, 287, 967, 2660b, 1263.

Plan 1220, Mitford harbour. Var. 1° 50' E.

Modum island lies northward of East entrance, the passage between Pagassan and Lampassan islands, a reef extends about $3\frac{1}{2}$ cables from its western side. The island is densely wooded.

Mitford harbour is situated on the south side of Banguay island, and within the islands just described. In the harbour are numerous coral reefs, but there appear to be clear spaces of considerable area, that off the site of the old settlement, abreast Middle entrance, having depths varying from 5 to 11 fathoms. The harbour has only been partially surveyed.

There are three entrances to it; the West entrance and channel within has about 5 fathoms; the Middle and principal entrance, between Pagassan and the island westward of it, is about one cable wide, and has depths of 7 to 10 fathoms.

The East entrance, between the reefs extending from Pagassan and Lampassan islands, is $2\frac{1}{2}$ cables wide, narrowing to $1\frac{1}{2}$ cables at one mile from the sea, off the south end of Modum island, the depths varying from 6 to 10 fathoms.

There are no dangers in the channel, which has a north-north-west direction for about one mile, and then turns westward, northward, and eastward around the reef extending off the western end of Modum island, to the anchorage between that island and the south side of Banguay. A depth of 5 fathoms can be carried up to the anchorage.

Beacons.—The passage up to the settlement, through the East entrance, is marked by beacons painted red on the port hand entering and white on the starboard, situated on the edges of the reefs.

Settlement (*Lat. $7^{\circ} 11' N.$, Long. $117^{\circ} 9' E.$*).—A small settlement is situated on the coast of Banguay island, abreast Modum island. The settlement of Mitford, formed by the North Borneo Company, was situated on the north shore of the harbour, with a pier extending out to the edge of the reef which fronts it. It was abandoned in 1882, and no signs of its existence now remain.

Tide.—The rise of tide is 7 feet.

Water.—The water supply is reported to be good.

At 8 miles from Mitford, at the foot of Banguay peak, is a German tobacco plantation, named Limbuak, on the river of that name, which discharges on the west coast of Banguay.

Anchorage.—There is anchorage in from 4 to 5 fathoms, sand and ooze, in mid-channel between Banguay and Modum islands, abreast the centre of Modum, where the channel is a quarter of a mile wide between the reefs which fringe the shores to a distance of half a cable on the south side, and from a half to one cable on the north side. The approach to this anchorage is through the East entrance.

General charts 948, 287, 967, 2660b, 1263.

Plan 1220, Mitford harbour. Var. 1° 50' E.

Directions.—Middle entrance.—In steering for the entrance of the middle channel, the two patches one mile south-east of it must be avoided; the west extreme of Pagassan island bearing N.W. $\frac{1}{2}$ N. leads eastward of the 4-fathoms patch; and the same point bearing N. by W. leads westward of the 5-fathoms patch. The middle of the hill (663 feet in height) close behind Mitford, bearing N. 47° W. leads through the centre of the Middle channel; when inside the islands, steer for the end of the pier, avoiding a reef lying $1\frac{1}{2}$ cables south-south-eastward from it. *See the caution on plan 1220.*

The West entrance is not recommended.

East entrance.—Approach the entrance with the west end of Modum island bearing N. 33° W., and when in the centre of the entrance between the two outer beacons, steer north-north-westward for about a mile, and then follow the curve of the channel to the anchorage, it being only necessary to steer midway between the beacons, or, if they are not in position, between the reefs. There are no dangers in the channel.

Chart 948, Balabac strait.

South-east part of Banguey (*Lat. $7^{\circ}11'N.$, Long. $117^{\circ}15'E.$*).—About half a mile eastward of Lampassan a point extends from Banguey towards the channel, forming one side of an inlet choked by reef, the other side being a peninsula forming the south-east end of Banguey. A short distance off the point, on the reef extending from it lie two islets, and from these a number of rocks, almost connected, extend in a southerly direction nearly $1\frac{1}{2}$ miles. The south-east extreme of Banguey is bordered by reef, beyond which and off the mouth of the inlet just mentioned lie two large patches, the outermost being a mile from the shore reef.

DANGERS. — North side of Banguey South channel.—Carrington reefs, situated about $2\frac{1}{2}$ miles east-south-eastward from the east end of Lampassan, are composed of coral, for the most part dry at low water; they extend 4 miles in an east and west direction, and are one mile in breadth; at 4 cables from the north side of these reefs is a detached patch of $2\frac{1}{2}$ fathoms. Between this shoal and the dangers extending from the Banguey shore is a channel three-quarters of a mile wide, but which, as a matter of ordinary navigation, no vessel would require to use. It is, however, practically available for small steam vessels, which may afterwards round the Carrington reefs and return into Banguey South channel; or they may proceed into the Sulu sea, either by the narrow and intricate passage between the shore reefs and those surrounding Bankawan and Latoan; or by Bankawan channel, a broader and much less intricate passage, separating the Bankawan reefs and South-east Banguey dangers.

General charts 948, 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

The main channel, however, lies between the Carrington reefs and those off the north part of Mallawallé island, and this channel only should be used by strangers, taking care not to near the former dangers under a depth of 13 to 15 fathoms; the apex of Pagassan bearing N. 83° W. leads close to the southward, and the east end of Lampassan N. by W. $\frac{1}{4}$ W. leads westward.

South-east Banguay dangers comprise an extensive group of reefs and shoals $10\frac{1}{2}$ miles in length, in an east-north-east and west-south-west direction, and nearly 5 miles in breadth, situated $1\frac{3}{4}$ miles eastward of Carrington reefs. The west end of the group is defined by two small isolated reefs, dry at low water and steep-to; a good look-out is essential when nearing them, and the same precaution will have to be observed when passing through the channel, as the reefs forming the southern edge of these dangers are all steep-to. A space about 2 miles in extent, at the eastern part of South-east Banguay dangers, is studded by a number of coral patches with from one to 5 fathoms water, and from the outer or north-eastern one, the summit of Latoan island (*Lat. 7° 16' N., Long. 117° 21' E.*) bears N. 72° W., distant $8\frac{1}{2}$ miles.

Bankawan channel, separating Bankawan reefs from South-east Banguay dangers, is three-quarters of a mile wide at its narrowest part. The channel is nearly straight, and lies in a N. 52° E. and opposite direction, but it will be necessary to keep a good look-out for the reefs on either side: with proper precautions there will be no difficulty in taking a vessel safely through.

NORTH-EAST COAST OF BORNEO.

The north-east coast of Borneo with the off-lying islands, not previously mentioned, from Sampanmangio point on the north to Sibuko river in the south, along a coastline of about 460 miles, will now be described. There are several good harbours, the principal one of which is Sandakan, the seat of Government and chief place of trade. The Company has also settlements at Kudat in Marudu bay, Mitford harbour in Banguay island, Lahat Datu in Darvel bay, Simporna in Trusan Treacher, and Tawao in Sibuko bay. For description of the territory of the British North Borneo Company, *see* page 8.

Climate, Meteorology, &c., from the report of Dr. James Walker, M.D., principal Medical Officer; *see* pages 8, 9, and 11.

Tides.—The tidal wave that enters the Sulu sea from the China sea by Balábac strait and Banguay channel, penetrates as far as Unsang peninsula, where it meets the wave from the Celébes sea, which enters by the Sibutu channel. The time of high water of the wave from the China sea is 10h. 0m. to 12h. 0m.; and of that from

General charts 287, 967, 2660b, 1268.

Chart 948, Balábac strait. Var. 1° 5' E.

Celébes from 6h. to 7h. The range of the tides is 8 feet at Sandakan; 5½ feet off Dewhurst bay, and in Dent haven 3½ feet.

Chart 3728, Marudu bay. Var. 1° 50' E.

N.W. POINT OF BORNEO.—**Sampanmangio point** (*Lat. 7° 3' N., Long. 116° 45' E.*), the north-west extreme of Borneo and the western point of Marudu bay, is readily distinguished by the tall casuarinas which rise from its grassy bluff, and by the island of Kalampunian off it. From the point the coast trends south-eastward for 6½ miles to Tanjong Aru or First point, and is bordered by rocks and shoal water extending off half a mile in places.

Kalampunian island, one mile northward of Sampanmangio point, is of sandstone formation, similar to the nearest bluff of that point, and rises abruptly from a flat to the height of 40 feet. The flat is of considerable extent, and composed of detached reefs.

There is a safe channel nearly half a mile wide between it and the mainland, having depths of 7 and 8 fathoms. The dangers are visible and are easily avoided by a careful lookout from aloft.

MARUDU BAY, at the head of which the Marudu river discharges, is about 25 miles in length in a southerly direction, and about 11½ miles in width at its entrance, between Tanjong Aru or First point and Cape Mafsie on the east, in which are depths of 13 to 18 fathoms, decreasing gradually towards the head of the bay, which is shallow to the distance of 3½ miles.

Aspect.—Low hills rise from the western shore of this bay to a height of about 500 feet; Melau Besar, 680 feet high, and Matungun, 1,360 feet high, are easily recognised, the summit of the former being bare and flat, while the latter is thickly wooded.

From the eastern shore the hills rise to a height of over 2,000 feet, and are all thickly wooded.

The rivers flowing into Marudu bay shift their channels after each rainy season, and are only available for boats after the beacons have been again placed in position.

Anchorage may be obtained in depths of from 5 to 10 fathoms, muddy bottom, almost anywhere towards the sides of Marudu bay.

Western shore.—From Tanjong Aru the coast trends south-south-east for 4½ miles to Tanjong Kapor or Second point, and is foul to a distance of half a mile. At 2 miles south-eastward of Tanjong Aru and three-quarters of a mile off-shore are two patches of 4½ fathoms with 8 to 10 fathoms around. From Tanjong Kapor, which is 60 feet high, the coast trends south-south-west about one mile to Tanjong Bornugus at the entrance to Kudat harbour. A reef of sand

General charts 948, 287, 967, 2112, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

and coral which dries in patches extends two-thirds of a mile from the shore.

Plan 946, Kudat harbour.

KUDAT HARBOUR, situated on the western shore of Marudu bay, extends westward about 4 miles, and is $1\frac{1}{2}$ miles wide in the entrance between Tanjong Bornugus on the north and Tanjong Tigasamil on the south. It affords anchorage in 4 to 7 fathoms water, sheltered from the swell during the north-east monsoon by a reef which extends about three-quarters of a mile from its north entrance point. At about one mile within the entrance points the water becomes shoal. On the northern side of the harbour westward of the settlement (page 145) is a shallow bay more than a mile wide between the Residency and Egeria bluff and three-quarters of a mile deep, into the north-western corner of which the Bum Bun river discharges; the river has $1\frac{1}{2}$ feet on the bar at low water springs, with from 2 to 4 fathoms within for a distance of $1\frac{1}{2}$ miles. At nearly a mile westward of Egeria bluff the land attains an elevation of 411 feet.

At $2\frac{1}{2}$ miles within the entrance the width of the harbour contracts to $5\frac{1}{2}$ cables, expanding again at the head and forming three shallow bays, into the southern of which the Tegarangan river discharges; this river has $1\frac{1}{2}$ feet at low water springs in the entrance with from 2 to 5 fathoms within, over a distance of $1\frac{1}{4}$ miles.

White rock, 27 feet high, lies about one cable from the southern shore of the harbour, about 2 miles within the entrance; between the entrance and White rock the south shore is bordered by a reef extending off a quarter of a mile in places. The hills on the southern side of the harbour have an elevation of from 212 to 460 feet.

Landmarks.—Conspicuous objects in Kudat harbour are Sandilands rock lighthouse, the pier, town flagstaff, Gueritz rock beacon, and White rock.

Dangers.—**Sandilands rock** (*Lat. $6^{\circ} 52' N.$, Long. $116^{\circ} 52' E.$*), with 6 feet least water, and situated in the centre of the entrance, is about 150 yards in length east and west, and 50 yards in breadth. There is a pile lighthouse on it. *See* page 144.

Witti rock, with less than 6 feet over it and a depth of 3 fathoms close northward, is situated N. 15° E. distant $2\frac{7}{10}$ cables from Sandilands rock lighthouse; another patch of less than 6 feet water lies south-south-westward from it, distant one cable.

Gueritz rock.—Beacon.—Gueritz rock, with about 3 feet water, lies S. 31° E. $3\frac{1}{4}$ cables from the harbour jetty, and is marked at its south extreme by a wooden beacon 12 feet in height, surmounted by a white topmark.

General charts 3728, 287, 967, 2660b, 1263.

Plan 946, Kudat harbour. Var. 1° 50' E.

Gueritz rock forms the south extreme of the bank which stretches off two-thirds of a mile between Tanjong Kapor or Second point and Tanjong Bornugus.

A shoal $1\frac{1}{2}$ cables long and narrow, having over it depths of 2 and 3 fathoms, lies about a cable off the eastern edge of this bank; at 3 cables northward of Witt rock.

A rock with less than 6 feet over it at low water springs lies in the middle of the harbour S. 59° W., distant three-quarters of a mile from the Residency flagstaff. It has from $1\frac{1}{4}$ to $1\frac{1}{2}$ fathoms around it.

Datum rock, only covered at the highest springs, lies on the edge of the bank fronting the shore westward of the harbour jetty.

Tigasamil spit.—Beacon.—Tigasamil spit, which dries, extends nearly 4 cables north-eastward of Tanjong Tigasamil, the southern entrance point of Kudat harbour, with depths of about 3 feet, increasing to one and $2\frac{1}{2}$ fathoms at $1\frac{1}{2}$ cables beyond, with 9 to 10 fathoms close-to; the north-east extremity of the spit is marked with a beacon in a depth of 12 feet. An islet 20 feet high lies close off Tanjong Tigasamil.

A reef, which dries, extends $2\frac{1}{2}$ cables northward of the point within Tigasamil, with Tern rock 4 feet high standing upon it.

Lights (*Lat. $6^{\circ} 52' N.$, Long. $116^{\circ} 52' E.$*).—A red and green fixed light, visible 2 miles in clear weather, is exhibited at an elevation of 7 feet above high water from a white pile beacon erected on Sandilands rock. For sectors, see Light list and plan.

A fixed red light is exhibited from the harbour jetty, visible seaward, but obscured over the western part of the harbour.

Anchorage.—The best anchorage is in about $6\frac{1}{2}$ fathoms, mud, southward of the settlement, with the flagstaff near Tanjong Bornugus bearing N. 8° W. distant about $6\frac{1}{2}$ cables and Sandilands rock light-house N. 83° E. Sandilands rock light is obscured over this anchorage. Or nearer the settlement according to draught.

Directions.—After passing Kalampunian island, the coast should not be approached within 2 miles, and when abreast of Tanjong Aru or First point, a remarkable hill, Melau Besar, will be seen southward of Kudat harbour. This hill, kept open eastward of the islet off Tanjong Tigasamil, bearing S. 17° W., will lead eastward of the spit extending from Tanjong Kapor or Second point, and of Sandilands rock; and when Johnstone bluff, on the northern shore near the head of Kudat harbour, bears N. 87° W. it may be steered for, passing between the pile beacon light on Sandilands rock and Tigasamil spit. A course may then be shaped for the anchorage, taking care to avoid Gueritz rock.

General charts 3728, 287, 967, 2660b, 1263.

Plan 946, Kudat harbour. Var. 1° 50' E.

If entering at night, and having passed southward of Sandilands light, the jetty light will afford facilities for selecting an anchorage.

Caution.—The beacons are not to be depended on.

Tides.—It is high water, full and change, in Kudat harbour at about 10h. 50m.; springs rise $5\frac{1}{2}$ to $6\frac{1}{2}$ feet; neaps rise $4\frac{1}{2}$ feet. The tidal streams are weak, the maximum velocity observed during a stay of three months being half a knot.

Kudat (*Lat. 6° 53' N., Long. 116° 51' E.*), the settlement of the North Borneo Company, is situated on the north point of the entrance to the harbour; it owes its importance to its being the distributing centre for the various tobacco and rubber estates in the vicinity.

In 1901 the population numbered 1,200.

There is a native hospital, several churches, and Government offices.

A Resident lives at Kudat, and also officials of the North Borneo Company. The Residency is near the point half a mile westward of Tanjong Bornugus, and has a flagstaff and small pier.

Jetty.—Vessels of 16 feet draught can lie afloat alongside the jetty at the south extreme of the settlement.

Trade.—The chief exports are tobacco, cutch, timber, camphor, and beeswax; over $1\frac{1}{2}$ million pounds of tobacco are shipped annually to Europe.

Shipping.—In 1907 the number of vessels entered was 121.

Communications.—The North German Lloyd steam vessels, trading between Singapore and Sandakan, call every fortnight, and those trading between Singapore and Hong Kong call monthly. Frequent communication by launches is maintained with Sandakan.

Kudat is connected by telegraph with Labúan, Jesselton, and Sandakan, and with the general telegraphic system *via* Labuan.

Supplies.—The water supply is not good; none is obtainable for shipping. Beef is fairly plentiful and good; fowls are plentiful and cheap; vegetables and bread are scarce. There is no coal.

Climate.—The mean maximum temperature is 87° Fahr., and the mean minimum 74°. From May to August the temperature reaches 92° at times. Rainfall is about 130 inches. December to March are the most rainy months, about 85 inches falling in that period; the remainder is distributed over the other months. The south-west monsoon is the most unhealthy period at Kudat; fever is then prevalent and rather severe; whilst at the opposite season, with the wind coming across the sea, it is almost absent.

General charts 3728, 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

Pulo Melau, an island about 65 feet high, lying $1\frac{1}{2}$ miles southward of Tanjong Tigasamil, is triangular in shape, about one-third of a mile in extent, and connected with the mainland at low water. A reef which dries extends half a mile east-south-eastward and southward; the eastern part of it is surrounded by shoal water to a distance of $1\frac{1}{2}$ cables, but to the southward there are 7 fathoms close-to.

The bay northward of Pulo Melau has depths of from 8 to 10 fathoms, and is clear of dangers outside a distance of 6 cables from the shore; within that distance the shores of the bay are fronted by reefs and detached rocks.

Pirate point (*Lat. 6° 46' N., Long. 116° 52' E.*), 3 miles southward of Pulo Melau, is a low sandy point fringed with mangroves; a sandy spit extends half a mile from this point and to the mouth of a small river situated half a mile north of the point.

Coast.—From Pirate point the coast trends south-westward, with mangroves and small streams at intervals, and is bordered by reefs, sand and mudflats extending off about 4 cables in places.

Brandon reefs.—Several large coral patches which nearly uncover at low water are situated south-south-westward of Pirate point at from one to $1\frac{8}{10}$ miles from the shore, over an extent of nearly 2 miles north and south.

From the outer of these patches Pirate point bears N. 17° E. distant $5\frac{1}{2}$ miles. They lie near the outer edge of a shoal bank which extends 2 miles off-shore; about 2 cables outside the northern patch is a small bank with $1\frac{1}{2}$ feet on it and a depth of $3\frac{1}{2}$ fathoms between, and at the same distance south-eastward of the outermost patch the depth is $1\frac{1}{2}$ fathoms.

Woody island, about 18 feet high, lying nearly $8\frac{1}{2}$ miles south-south-westward from Pirate point and off the entrance to Matungan river, is a small mound surrounded by low rocks studded with mangroves. It is about 9 cables from the shore on the south side of the river entrance, and is connected with it at low water by a sandbank which dries 2 feet.

Coast.—From west of Woody island the coast, fringed with mangroves and intersected by small streams, trends in a southerly direction for a distance of 4 miles to the entrance of Marudu river, and is fronted by extensive sand and mud flats, the latter of which dry from one to 2 feet.

Marudu river.—Depths.—The channel leading to the entrance of the Marudu river has a least depth of $1\frac{1}{2}$ feet, and follows a general west-south-westerly direction for about 3 miles between

General charts 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

extensive mudbanks which extend 2 miles from the shore, and dry from one to 5 feet at low water springs.

Beacons mark the channel leading to the entrance of the river, but their positions are constantly changed as the channel alters.

Small launches of about 6 feet draught can ascend this river for about 3 miles at high water, but the channel must be previously marked by beacons.

Marudu river is reported to be shoaling.

Plan of Marudu river and Tanjong Batu anchorages on 3728.

Anchorage.—Vessels of 15 feet draught can anchor off Marudu river in about $3\frac{1}{2}$ fathoms, mud, with the pier at Tanjong Batu bearing S. 65° E., distant about $2\frac{1}{2}$ miles.

Large vessels must anchor 3 cables north-eastward of this position in from $5\frac{1}{2}$ to 6 fathoms, or on the same bearing 8 cables from the pier.

Coast.—From the entrance to Marudu river the coast trends east for a distance of 5 miles to the mouth of Taritipan river, and is covered with dense mangroves; mudbanks which dry from one to 2 feet front the shore. Behind the mangroves at the head of the bay are rubber and tobacco estates.

Chart 3728, Marudu bay.

Eastern shore.—Cape Mafsie (*Lat. $6^{\circ}56'N.$, Long. $117^{\circ}2'E.$*), the eastern entrance point of Marudu bay is situated S. 82° E., $11\frac{1}{4}$ miles from Tanjong Aru; it is 56 feet high, with conspicuous white cliffs and a sharp rock, 35 feet high, and another rock 30 feet high, lying close to it.

Reef.—The cape is fronted by a reef which extends one-third of a mile off, whence its edge trends north-north-westward for nearly $2\frac{1}{4}$ miles, and then eastward for nearly $1\frac{1}{2}$ miles; its western edge is of irregular shape, and the breadth of the reef varies from one to 2 miles; the eastern edge faces the inlet leading to the Melobong river. A detached reef about one-third of a mile in extent, the southern part of which dries, lies a quarter of a mile off the north-western extremity, and foul ground extends three-quarters of a mile northward of the main reef. Between the reef and the shore are narrow lanes of deep water.

Dangers.—A shoal about 4 cables in extent with a least depth of 2 fathoms lies N. 44° W., $3\frac{1}{2}$ miles from Cape Mafsie.

At $1\frac{1}{4}$ miles N. 49° W. from the cape, and a quarter of a mile from the edge of the reef described above, is a rocky shoal one-third of a mile in length, the centre part of which dries.

General charts 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

A coral patch of $2\frac{1}{2}$ fathoms lies N. 79° W., distant nearly 2 miles from the cape.

Tanjong Perawan, about $2\frac{1}{2}$ miles southward of Cape Mafsie, is 56 feet high, and is easily distinguished by its red cliffs. From this point the coast curves south-eastward to the mouth of the Benkoka river, forming a shallow bay, off the shore of which the sand dries from one-quarter to three-quarters of a mile. Casuarina trees extend along the coast southward of Cape Mafsie. A flat with depths of less than 3 fathoms extends $2\frac{1}{2}$ miles off-shore between Tanjong Perawan and Benkoka river. *See Anchorage, page 142.*

Benkoka river.—The entrance to this river, the largest in Marudu bay, is situated 3 miles southward of Tanjong Perawan and opposite Kudat harbour. The mouth is about 4 cables wide, rapidly decreasing to an uniform breadth of about one cable; it is obstructed by a large sandspit, which extends $1\frac{1}{2}$ miles from the shore on the north side of the entrance. Benkoka islet, the tops of the trees on which are 25 feet high, lies on the southern side of the sandspit, nearly three-quarters of a mile from its extremity. At $1\frac{1}{2}$ miles eastward of Benkoka islet the river takes an abrupt turn to the southward, a branch continuing to the south-eastward.

Talaga village lies on the north bank of the branch just mentioned, about 2 miles eastward of Benkoka islet; there are several villages in the neighbourhood of the Benkoka river.

Depth.—The depth on the bar of Benkoka river is about 3 feet at low water springs in the beaconed channel, within which the depths increase.

Launches of 6 to 8 feet draught can at high water ascend the river to the village of Pitas (*Lat. $6^{\circ} 43' N.$, Long. $117^{\circ} 4' E.$*), a distance of 12 miles, where there is a tobacco estate.

Beacons.—The channel leading to the entrance of the Benkoka river is marked by beacons, the positions of which are constantly changed as the channel alters.

Coast.—The coast from Benkoka river to a rounded point abreast Zebra reefs is sandy and fringed with high casuarina trees, and is fronted by shoal water extending from three-quarters of a mile to $1\frac{1}{2}$ miles from the shore; between this point and another, $2\frac{1}{2}$ miles southward, the coast recedes eastward, forming a bay about one mile deep, the shores of which are intersected by streams and mangroves, the hills at the back sloping gradually to the sea. The shore of the bay is fronted by a bank of sand and coral to a distance of half a mile in places.

General charts 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

Tenga river.—The mouth of this river adjoins that of the Benkoka, being distant $1\frac{1}{2}$ miles south-westward from Benkoka islet. The Tenga is a branch of the Benkoka river, and flows into the bay between two sandspits which extend two-thirds of a mile from the shore. The depth on the bar between these spits is one foot at low water springs.

Taka river.—The entrance to this river is situated $3\frac{1}{4}$ miles south-westward of the entrance to the Tenga river. The western side of the entrance channel is formed by a sandspit which projects northward for more than a mile. The bar of the river, off the extremity of the sandspit, has less than 2 feet on it at low water springs and generally breaks.

Zebra reefs are coral patches with deep water between them, and also between them and the shore; they are situated south-westward of the entrance to the Taka river, between 6 and 9 cables from the coast.

Plan of Cutch factory anchorage on chart 3728.

Landmark.—A cutch factory, the chimney of which is 90 feet high and forms a conspicuous landmark, is situated about 6 cables south-westward of the southern point of the bay last described, and near Mempakit village.

Anchorage.—Good anchorage can be obtained in a depth of 7 fathoms, mud, with the factory chimney bearing S. 63° E., distant 4 cables.

Powell rock, with a depth of less than 6 feet over it, lies $4\frac{1}{2}$ cables from the shore, with the factory chimney bearing S. by E., distant $6\frac{1}{2}$ cables. Abreast Powell rock a reef dries off from the shore for $2\frac{1}{4}$ cables.

Chart 3728, Marudu bay.

Barraut reef (*Lat. $6^{\circ} 43'$ N., Long. $116^{\circ} 54'$ E.*) is a rocky shoal a quarter of a mile in length, north and south, by $1\frac{1}{2}$ cables broad. The least depth of 4 feet is on a coral patch about half a cable long and a quarter of a cable broad, situated at the southern end of the reef, on the northern part of which the depth is $1\frac{1}{2}$ fathoms. It lies about 3 miles from the eastern shore of the bay, and from the shoal spot Sandilands rock lighthouse bears N. 17° W., distant $9\frac{8}{10}$ miles.

Ridge point lies $3\frac{1}{2}$ miles S. 58° W. from the cutch factory; the shore between is fringed with a reef of sand and coral, which extends in a north-north-easterly direction for about one mile from Ridge point.

General charts 3728, 287, 967, 2660b, 1263.

Plan of Marudu river and Tanjong Batu anchorages on chart 3728.

Tanjong Batu (*Lat. 6° 37' N., Long. 116° 51' E.*), situated at the south-eastern corner of Marudu bay, and 4 miles south-westward from Ridge point, is a low point, on the west and south sides of which sandspits, dry at low water, extend off about one cable.

The river Mari Sim sim enters the sea on the south side of the point.

Pier.—At three-quarters of a mile southward of Tanjong Batu there is a pier, 414 feet long in a north-west direction, with a depth of 5 feet at low water at the outer end. Here are the offices and the head-quarters of the North Borneo Exploration Company.

A railway, 3 miles long, connects the head of this pier with the manganese mines at Taritipan.

Between Tanjong Batu and the pier is a small and shallow bay, the mud at the head of which dries out $1\frac{1}{2}$ cables.

Anchorage.—Vessels of 15 feet draught can anchor in a depth of $5\frac{1}{2}$ fathoms with the pier bearing S. 64° E., distant three-quarters of a mile, and those of less draught can anchor with the pier on about the same bearing, distant 4 cables, in a depth of about 4 fathoms, muddy bottom.

Chart 3728, Marudu bay.

COAST.—From Cape Mafsie the coast trends north-north-eastward $1\frac{1}{2}$ miles to the western entrance point of an inlet leading to Melobong river, and is fronted by the reef extending northward described on page 147. The eastern entrance point of the inlet is surrounded by a reef which contracts the width of the channel to about 6 cables; the south-western angle of the eastern reef is marked by a beacon. From the outer points of the reefs the inlet is 3 miles in length in a south-easterly direction, and the head is much obstructed by mudbanks, which leave a narrow channel towards the eastern shore. The least water in the approach to the river is apparently about 5 feet at low water about a quarter of a mile outside the entrance, the general depths in the inlet being from $1\frac{1}{2}$ to 3 fathoms.

Pulo Perak is a thickly wooded islet with the tops of the trees about 90 feet high, and nearly a quarter of a mile long. It is situated about a quarter of a mile off the eastern entrance point of the inlet leading to the Melobong river.

Melobong river.—Boats entering Melobong river steer for Pulo Perak on an easterly bearing, and when within a distance of one mile a south-easterly course leads towards the mouth of the river.

Coast.—From Pulo Perak the coast of Borneo trends east-north-eastward to Inaruntang point, $6\frac{1}{2}$ miles distant; at about midway the

General charts 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

shore recedes south-eastward, forming a bay nearly 2 miles wide in the entrance and $1\frac{1}{2}$ miles deep. The shore is bordered by a reef, which completely fills up the bay mentioned.

Chart 948, Balabac strait.

Inaruntang point (*Lat. 7° 1' N., Long. 117° 9' E.*) is the northern extreme of a tongue of land which projects northward for about 23 miles between Marudu and Paitan bays, with an average width of 13 miles. From the point the coast trends south-eastward to abreast Silk island, and is fronted by a shoal bank extending from 2 to 3 miles off-shore, on which are numerous reefs and rocks, sunken and awash, on the south-western side of the Mallawallé channel.

Silk island, lying $3\frac{1}{2}$ miles south-eastward from Inaruntang point and a quarter of a mile from the shore, is nearly a mile long east and west and 6 cables broad. It is surrounded by a reef which extends half a mile eastward from it. The north-eastern side of Silk island is a red cliff 36 feet high.

ISLANDS and DANGERS on the north coast of Borneo.—N.W. and North Borneo dangers.—Lying off the north coast of Borneo are a number of coral shoals, generally of small extent, some partially dry at low water, whilst others dry entirely, and two are marked by sand cays, which shine brightly in the sunlight. Those dangers only will be described which limit the channels proper for vessels to proceed by; to mention the others in detail would tend rather to confuse navigators, who can have no inducement to risk the safety of their vessels by venturing amongst them.

Chart 3728, Marudu bay.

South side of Banguay South channel.—Outer shoal.—Buoy.—Outer shoal, the largest of the N.W. Borneo dangers, forms the south-west limit of Banguay South channel; it is about one mile in extent and steep-to, with about 6 feet water, and a patch which dries on its eastern side. From its north-west end the summit of Little Molleangan bears N. 33° E., and is distant $2\frac{1}{2}$ miles.

A red and white vertically striped can buoy is moored off the north-west end of the Outer shoal.

A sand cay on the east side of a coral ledge nearly awash and steep-to, lies S. 77° E. $2\frac{3}{4}$ miles from the north-east extreme of Outer shoal.

Nearly midway between Outer shoal and this sand cay is a small coral patch with 6 feet water, and a depth of 15 fathoms around.

Another sand cay, in the centre of a coral ledge, lies one mile eastward of the former. These cays are useful as marking the limits of the channel, on the Borneo side, and being composed of white coral sand, are conspicuous.

General charts 948, 287, 967, 2660b, 1263.

Chart 3728, Marudu bay. Var. 1° 50' E.

Nearly 3 miles east-north-eastward from the eastern sand cay is a 2-fathoms patch, with two ledges which dry a short distance southward; from this shoal, which is the most northerly of the North Borneo dangers, the summit of Patanunam bears N. 31° W., distant about 3½ miles.

Chart 948, Balábac strait.

About 1½ miles East from the 2-fathoms shoal is the outer of two coral ledges lying close together, with Patanunam summit bearing N. 48° W., distant 5¼ miles. A 3-fathoms patch lies 3 cables east-south-east, and a ledge of rocks is distant about 1½ miles in the same direction from these dangers; the latter is within a third of a mile of the reef fronting the Borneo shore south-eastward of Inaruntang point to a distance of about 2 miles, with numerous rocks with less than 6 feet of water on them close to its edge.

Chart 3728, Marudu bay.

Dangers in the fairway.—Ten-foot rock, the westernmost of the fairway dangers, is a coral head 70 yards in length, with a least depth of 1½ fathoms, and 12 to 17 fathoms close around; it lies with Patanunam summit bearing N. 16° W., distant about 2½ miles. As other dangers may exist here, the utmost caution should be used when navigating in this locality. About one-third of a mile southward of the Ten-foot rock are heavy tide rips.

Petrel rock (*Lat. 7° 4' N., Long. 117° 7' E.*) is a narrow ridge of coral about 40 yards in extent, with 14 feet water, and a depth of 12 fathoms close around. It lies about 6 cables north-north-eastward of Ten-foot rock.

Beacon.—A patch of 1½ fathoms lies about three-quarters of a mile eastward of Petrel rock. It is marked by a beacon consisting of a staff surmounted by a ball, painted vertically red and white.

Chart 948, Balábac strait.

South channel dangers comprise six coral reefs lying in the fairway eastward of Petrel rock, with irregular depths between. Three of these reefs lie in an east and west direction, about half a mile apart: the two westernmost dry at low water; the other is a strip of coral nearly three-fourths of a mile in length, with a rock nearly awash at its eastern extreme. A 2½-fathoms patch lies S. 17° E. 6 cables, and another with the same depth N. 56° E. 1½ miles from the rock nearly awash. Between the different dangers are passages which it is possible for vessels to pass through, but, as this would serve no useful purpose, it is advisable to consider these shoals as a dangerous group.

Clearing marks.—The apex of Molleangan island W. by S. leads northward of South channel dangers; the same object W. ¼ N. leads southward, but close northward of the 1½-fathoms patch marked by a beacon.

General charts 948, 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

Mallawallé island, about $6\frac{3}{4}$ miles distant from the south-east part of Banguéy, and $7\frac{1}{4}$ miles eastward from Inaruntang point, is of irregular shape, $5\frac{1}{2}$ miles in length in a west-north-westerly and east-south-easterly direction, and from $1\frac{3}{4}$ to $3\frac{3}{4}$ miles in breadth. The island for the most part consists of ranges of hills from 400 to 500 feet high; but one range, towards the north-west end, attains the elevation of 562 feet. Close to the coast, on the west side, is West islet; North-west islet lies a short distance off the north-west end, and North islet, low and nearly one mile in length, almost joins the north part of the main island.

The island is fringed by a reef which extends nearly a mile in places from the east, north, and west points, and to about half that distance from its south point. Mallawallé island is a British possession.

A sand cay (*Lat* $7^{\circ} 6' N.$, *Long.* $117^{\circ} 18' E.$) is situated on a reef about a mile in length at two-thirds of a mile north-east of Mallawallé North islet, with patches east and west of it, forming the south side of Banguéy South channel (*see* the chart). Another sand cay marks the west end of a reef at about a mile off the east end of Mallawallé island; north-north-west $1\frac{1}{2}$ miles from this sand cay there is a narrow coral patch, half a mile in length, with 13 fathoms close around it.

MALLAWALLÉ EASTERN DANGERS comprise a large number of detached reefs and shoals which extend 10 or 11 miles in an easterly and south-easterly direction from Mallawallé. It is only the northern edge of these dangers, forming the eastern part of Banguéy South channel, which require description, for there can be no object in risking a vessel amongst them.

About $2\frac{3}{4}$ miles N. 54° E. from the sand cay off the eastern end of Mallawallé island is a coral reef which dries, and has depths of 13 and 16 fathoms close around. One-third of a mile southward of this reef is a reef half a mile in extent with less than 6 feet water over it. A cluster of reefs, occupying a space $1\frac{1}{4}$ miles in extent, with 13 fathoms close to on the northern side, lies a mile eastward of the coral reef just described, and N. 73° E. $3\frac{1}{2}$ miles from the same danger is a reef half a mile in length with $1\frac{1}{4}$ fathoms water on its northern end. This danger, being always covered, is not so readily seen as the others, and it is important to bear this in mind, as the shoal occupies a prominent position, bordering as it does on the deep water of Banguéy South channel.

The Straggler, a small coral islet, with trees 20 feet high, is a useful object for assisting in the navigation of the eastern part of Banguéy South channel. From it the $1\frac{1}{4}$ -fathoms reef just described

General charts 287, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

lies N. 62° W. nearly $1\frac{1}{2}$ miles, while westward of the islet are several other dangers. The reef surrounding the islet extends more than a mile in an easterly direction, and more than half a mile south-westward.

About $1\frac{3}{4}$ miles south-eastward from the eastern extreme of Straggler reef, and S. 73° E. from the islet, is the outer edge of a reef having in some places less than 6 feet water; half a mile eastward of it is a $3\frac{1}{4}$ -fathoms coral patch. Other dangers of the group extend 7 miles farther southward.

Fairway shoal (*Lat. 7° 7' N., Long. 117° 31' S.*), at the eastern entrance of South Banguey channel, is three-quarters of a mile in diameter, with a rock awash near its southern part, from which Straggler islet bears S.W., distant $2\frac{1}{2}$ miles. The southern edge of the shoal is, however, only $1\frac{1}{2}$ miles from the eastern extreme of Straggler reef, which limits the width of the channel southward of Fairway shoal; the channel northward of the shoal is nearly 3 miles wide. At $1\frac{1}{2}$ miles eastward of Fairway shoal there is a patch of $3\frac{1}{4}$ fathoms, three-quarters of a mile in length north and south, and half a mile broad, with deep water around.

Directions for Banguey South channel.—Attention to these directions must be supplemented by a vigilant and careful look-out from aloft. The best time for proceeding through from the westward is with the sun astern, when there is seldom much difficulty in making out the various dangers as the vessel advances. Balábac Main channel, however, is considered a safer route.

Having rounded Kalampunian island off the north-west extreme of Borneo, steer for Molleangan islands bearing about East, and when about 5 miles from the reef encircling them edge south-eastward, opening the summit of the larger island southward of the smaller island. Then steer to pass about three-quarters of a mile southward of the latter, observing that the whole of Patanunam island should not be opened eastward of Molleangan island until the summit of Little Molleangan bears N.N.E., which will lead clear of Outer shoal. Having passed Little Molleangan, steer more to the north-eastward, keeping within a mile of Molleangan and Patanunam.

Having passed those islands, bring the peak of Patanunam to bear S. 83° W. and steer N. 83° E. through the fairway between the South channel dangers and the rock off the south end of Pagassan, until the sand cay off the north side of Mallawallé island is abeam, distant about $1\frac{1}{4}$ miles, when a S. 73° E. course will lead clear of the dangers off the northern side of Mallawallé. When the sand cay off the east extreme of that island bears South, distant a little over 2 miles, steer E.N.E., which course being preserved will lead one mile northward

General charts 287, 2576, 967, 2660b, 1263.

Chart 948, Balábac strait. Var. 1° 50' E.

of Fairway shoal into the Sulu sea. Bearings of Straggler island will check the position of the vessel whilst westward of Fairway shoal.

Chart 287, Gaya bay to Sandakan harbour.

Mæander patch.—This dangerous reef, composed of coral and sand, with $1\frac{3}{4}$ fathoms water, is nearly half a mile in extent and steep-to; it is situated about $6\frac{1}{4}$ miles east-north-eastward of Fairway shoal, and N. 65° E., $17\frac{1}{2}$ miles from the north-east point of Mallawallé island.

About a mile westward is a patch of 3 fathoms, and at $1\frac{1}{4}$ miles eastward one of 6 fathoms; there are also small patches of 4 fathoms south of Mæander patch at the distance, respectively, of 2 and 4 miles.

A bank (*Lat. $7^{\circ} 17' N.$, Long. $118^{\circ} 6' E.$*), about half a mile in diameter, with a least depth of 9 fathoms, and 22 fathoms close around, was reported by H.M.S. *Wanderer* in 1890 to lie situated with Mount Ledan, Kagayan Sulu bearing S. 61° E., distant about 29 miles.

Charts 1650, 287.

The Pudsey Dawson dangers are a series of coral patches, the westernmost of which, with $2\frac{1}{2}$ fathoms, lies E. $\frac{1}{2}$ S. 19 miles from the east end of Mallawallé island; from this patch for about 16 miles in an east-north-east direction, there are several banks, principally coral and sand, with from $2\frac{1}{2}$ to 10 fathoms upon them, and deep water between. Between these shoals and the Mallawallé Eastern dangers is a shoal with about 6 feet water on it, from which the western summit of Tigabu bears S. 41° W., distant about 11 miles.

Detached shoal patches.—Northward of Pudsey Dawson dangers and of Mæander patch, to the parallel of lat. $7^{\circ} 25' N.$, and between the meridian of long. $117^{\circ} 50' E.$ and the dangers, already described, lying eastward of Banguay island, there are numerous coral patches dangerous to navigation. Many of these have depth of from $3\frac{1}{4}$ to 5 fathoms, and the space within the above approximate limits should be avoided by vessels when possible. *See charts.*

The Muligi patches consist of a number of coral banks, extending about 7 miles east and west, upon which the ascertained depths are from 5 to 10 fathoms; the easternmost of these patches, with 8 fathoms, lies N. 86° W., distant 20 miles, from the larger Muligi island. There may be less water on these patches, and numerous reefs are reported to lie westward of them.

Chart 287, Gaya bay to Sandakan harbour.

Shoals.—A shoal about half a mile in extent, with a depth of 5 fathoms over coral, lies $15\frac{3}{4}$ miles S. 79° W. from Muligi island.

General charts 287, 2576, 967, 2660b, 1263.

Chart 287, Gaya bay to Sandakan harbour. Var. 1° 50' E.

About three-quarters of a mile south-westward of it is another similar patch of coral, with 5 fathoms on it, separated from the former by a deep channel.

Monmouth shoals (*Lat. 6° 43' N., Long. 118° 9' E.*), lying south-westward of Muligi island, consist of a group of five detached coral shoals covered by from $2\frac{1}{4}$ to $4\frac{1}{2}$ fathoms, with deep water between them. They extend over a space of 6 miles in a north-easterly and opposite direction, and from the shoalest spot, $2\frac{1}{4}$ fathoms, situated in about the centre of the group, Muligi island bears N. 57° E., distant $19\frac{1}{4}$ miles.

It appears probable that these shoals are identical with Wanderer shoal, mentioned below.

Wanderer shoal, about 13 miles southward of the Muligi patches, is about 2 miles in extent, and has a depth of 2 fathoms, or less, at its south-east end. Its position is doubtful.

Chart 1650, Mallawallé island to Lankayan.

Minna reefs, about $3\frac{1}{2}$ miles in length north-west and south-east and three-quarters of a mile in width, with a depth of half a fathom at each end and $1\frac{1}{2}$ fathoms between, lie with their north-west extreme situated N.E. by E., distant 8 miles from Tigabu island.

Schuck reef, one mile in extent and with a depth of $3\frac{1}{2}$ fathoms, is reported to be situated in lat. 6° 49' N., long. 117° 52' E.

The space included between the Pudsey Dawson dangers, Muligi patches, Minna reef, Billeau dangers (*see* page 162), and Schuck reef has not been examined; this area is reported to contain numerous reefs with from one to 2 fathoms water. *See* pecked line on chart, within which no vessel should enter.

Chart 287, Gaya bay to Sandakan harbour.

Mambahenauhan.—The island Mambahenauhan, situated about $26\frac{1}{2}$ miles S. 2° W. from the south-east point of Kagayan Sulu, is 145 feet in height, of brown rock, with brushwood, and small trees on the summit. It is steep-to, and may be approached to a distance of half a mile.

Chart 1650, Mallawallé island to Lankayan.

COAST.—The north-east coast of Borneo, between Silk island in Mallawallé channel, and Sandakan harbour, is generally low, densely wooded, intersected by numerous rivers and streams, and for a considerable distance from the shore the water is shallow and abounds with coral reefs.

From abreast Silk island the coast trends eastward for $3\frac{1}{2}$ miles to the north-eastern point of Bankoka, whence it turns southward for 5 miles to the entrance of Paitan bay.

General charts 948, 287, 2576, 967, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

As it would be impracticable from any mere written description to navigate with safety among the numerous dangers which lie eastward of Mallawallé island, it will be sufficient to describe the principal dangers, the appearance of the various islands and objects which present themselves as marks, and the routes usually adopted by mariners acquainted with the coast; for further information the charts must be referred to.

Bankoka hill (*Lat. 6° 53' N., Long. 117° 14' E.*) is a conspicuous wooded hill, 587 feet in height, on the mainland south-south-westward $4\frac{1}{2}$ miles from the north-eastern point of Bankoka, eastward of Silk island, and $1\frac{1}{2}$ miles from the shore.

MALLAWALLÉ CHANNEL.—Dangers extend 3 or 4 miles off from the north-east coast of Borneo, and between these and Mallawallé island there is a channel $1\frac{3}{4}$ miles in width.

Mallawallé island is described on page 153.

DANGERS.—North side of channel.—**Egeria rocks**, about 2 cables in extent, covered by 3 feet water, and with a depth of 9 fathoms close around, lie S.W. by W., distant $2\frac{1}{2}$ miles from the islet north-west of Mallawallé, with the south extreme of the island bearing E. by S. $\frac{3}{4}$ S.

Reefs.—At $3\frac{3}{4}$ miles S. 66° E. from the southern point of Mallawallé island, is the south-westernmost of a group of small reefs which extend north-eastward $1\frac{1}{4}$ miles with depths of from 7 to 10 fathoms around them. The north-eastern reef dries one foot, and at 2 cables westward of the south-western reef is a patch of 4 fathoms.

Cay.—At $5\frac{1}{2}$ miles S. 75° E. from the southern end of Mallawallé island is a cay surrounded by a reef about a quarter of a mile in extent. At $1\frac{3}{4}$ miles east-south-eastward of the cay are two reefs about 3 cables in length parallel to each other, with dangers extending more than a mile northward of them.

Tibakkan, situated about $10\frac{3}{4}$ miles S. 66° E. of the south point of Mallawallé island, is a sand cay covered with trees 108 feet high. Dangers extend $1\frac{1}{2}$ miles in a north-easterly direction from this island.

Two coral reefs, about a mile in extent, lie $1\frac{1}{2}$ miles north-westward of Tibakkan, on the north-east side of the track recommended through the Mallawallé channel.

Tambulian (with bushes 12 feet high), **Bu-a-ning**, and the adjacent reefs (including the two coral reefs just described), form the south-eastern boundary of the Mallawallé eastern dangers.

Mosquito rock, about one cable in extent, with a depth of 3 feet, and steep-to, lies N.E. $\frac{1}{2}$ N. $2\frac{1}{4}$ miles from Tibakkan island.

General charts 948, 287, 967, 2576, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

Tigabu (Lat. $6^{\circ} 53' N.$, Long. $117^{\circ} 29' E.$), about $2\frac{1}{2}$ miles southward of Tibakkan, is an island about one mile in length, and densely wooded, the tops of the trees being 227 feet high; it is surrounded by a reef which extends two-thirds of a mile north-westward from the island. Detached reefs, on which are several sand cays, extend about $3\frac{1}{2}$ miles in an east-north-easterly direction and $2\frac{1}{2}$ miles north-eastward from Tigabu island.

South side of channel.—South-eastward of North Borneo dangers already described on page 152, and between them and Lin-gi-san reef are several rocks lying near the Mallawallé channel.

At 3 miles N. $82^{\circ} E.$ from Inaruntang point and $2\frac{1}{4}$ miles northward of Silk island is the northern end of a reef with less than 6 feet on it; at one-third of a mile north-eastward is a patch of 3 fathoms, and at three-quarters of a mile south-eastward from the northern end of the reef is a rock awash at low water; all these are near the 5-fathoms line.

Cay.—North-eastward of Silk island is a reef nearly $1\frac{3}{4}$ miles long north and south, with a cay about a mile from its northern end, which end is distant nearly 2 miles north-eastward from the red cliff on Silk island.

Lin-gi-san is a small rocky reef, with a head 30 feet in height, lying about N. $28^{\circ} E.$, distant $1\frac{3}{8}$ miles from the north-east point of Bankoka.

Passage reef.—At the distance of about 2 miles south-westward of the south end of Mallawallé island, and $1\frac{1}{4}$ miles N.E. by N. of Lin-gi-san rock, lies Passage reef, awash at low water spring tides, and easily distinguished; it may be passed on either side, but the route recommended lies northward.

Another reef, awash at low water, on which is a small sand cay, is situated $2\frac{3}{8}$ miles S. $86^{\circ} E.$ of Passage reef.

Fly rock, on the southern side of the Mallawallé channel, awash at low water, and about $1\frac{1}{2}$ cables in extent, lies N. $81^{\circ} E.$ $2\frac{1}{4}$ miles from Lin-gi-san, and is distant $1\frac{1}{2}$ miles S. $65^{\circ} W.$ from the sand cay above.

Southward of Fly rock and separated from it by a narrow channel there is a coral reef about a mile in extent, parts of which dry at low water.

Clearing marks.—Banguay peak in line with the west extreme of West island (Mallawallé), bearing N. $37^{\circ} W.$, leads between Passage reef and the cay eastward of it and eastward of Fly rock; and Kukuban island on with the north end of Tigabu island, bearing S. $65^{\circ} E.$, leads between Fly rock and the cay above mentioned.

General charts 948, 287, 967, 2576, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

Mandiralla, an island about half a mile in length east and west, is surrounded by a coral reef, which extends to a distance of about 6 cables on the north side, and for a mile eastward; it lies 5 miles eastward of the north-east point of Bankoka, and $6\frac{1}{2}$ miles southward of the eastern end of Mallawallé island. Mandiralla is densely wooded, the tops of the trees being 144 feet above the sea.

Foul ground extends about $3\frac{1}{2}$ miles east-south-eastward and $4\frac{1}{2}$ miles south-eastward of Mandiralla.

Tanj Bungaan is a thickly-wooded island of considerable extent lying about 4 miles south-east of Bankoka hill. Reefs extend $1\frac{1}{2}$ miles northward and nearly as far eastward from the island.

Bush island, lying $8\frac{3}{4}$ miles east-south-eastward from Bankoka hill, is a sand cay on which are a few bushes, the tops of which are about 10 feet high; it stands near the middle of a coral reef about $1\frac{1}{2}$ miles in length in a north-east and south-west direction.

Foul ground.—Much foul ground exists between Mandiralla, the coast of Bankoka, Tanj Bungaan, and Bush island.

Centre of channel.—Kukuban (*Lat. 6° 56' N., Long. 117° 25' E.*) is a sand cay situated on the south-west part of a coral reef, about half a mile in diameter, lying 4 miles eastward of Mandiralla; it is covered with trees 70 feet high. This cay and the dangers described below lie in the centre of Mallawallé channel, there being a passage on either side of them. *See the chart.*

Rocks.—Beacon.—Between Kukuban and Tigabu island, situated $4\frac{1}{2}$ miles south-eastward, there are the following dangers lying between the recommended tracks through the Mallawallé channel, and much caution is necessary when navigating in the neighbourhood:—

A rock, situated S.E. by S., distant $1\frac{1}{10}$ miles from Kukuban, awash at low water, and marked with a beacon surmounted by a black spherical cage.

A rock lying S. 18° E. 2 miles from Kukuban, awash at low water, but difficult to see.

Merlin rock, apparently nearly awash at low water and dark coloured, situated 7 cables east of the rock marked by the beacon.

A depth of $1\frac{1}{2}$ fathoms situated with Kukuban islet bearing N. 35° W., distant $2\frac{1}{10}$ miles; a patch of $3\frac{1}{4}$ fathoms lies 2 cables south-east of it.

These two shoals are small in extent, and are surrounded by depths of from 9 to 10 fathoms, mud bottom.

General charts 287, 2576, 967, 26606 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

A sand cay on a coral reef 3 cables in extent, and a coral patch of nearly the same dimensions lying respectively $1\frac{1}{2}$ miles E. by S. $\frac{1}{4}$ S. and $2\frac{1}{4}$ miles S.E. by E. from Kukuban; these are easily made out from the masthead.

NORTH-EAST COAST of BORNEO and OFF-LYING ISLANDS.—The coast from the vicinity of Bankoka hill trends southward and south-eastward for about 18 miles to a position $2\frac{1}{2}$ miles south of the south-eastern extreme of Simaddel island; it has not been surveyed. Between this part of the coast and Simaddel is Paitan bay, 11 miles wide, with numerous islets and reefs in it, and apparently shallow; it has been only partially examined. From the southern end of this bay the coast trends eastward to Tanjong Kinulubaltan, abreast the eastern end of Simaddel, whence it trends south-eastward for 18 miles to Tanjong Siasib, and then turns south to Labuk bay. The off-lying islands and reefs, between which a vessel must pass on her way from Mallawallé channel, were surveyed in 1881 and 1889 by H.M. Ships *Flying Fish* and *Rambler* to a distance of from 13 to 18 miles from the shore; beyond this distance there is the unexplored region extending northward to Pudsey Dawson dangers. See page 156.

Simaddel or Jambongon island, lying 13 miles south-eastward from Bankoka hill, is 11 miles in length east and west and about $7\frac{1}{2}$ miles in breadth. On the western side an inlet $1\frac{1}{2}$ miles wide, the head of which is not defined, penetrates the island in an east-south-easterly direction for over 3 miles. The land at the head of the inlet is low and densely wooded; the shores of the inlet and of the south and east sides of the island are wooded. There is a village on the south-east side of the island, and at about one mile on either side of it is a cliff 20 feet high, the southern of which is red.

North-east (*Lat. 6° 44' N., Long. 117° 23' E.*) and South-west bluffs are two prominent headlands $5\frac{1}{4}$ miles apart, both on the west coast of Simaddel; the former is 442 feet and the latter about 460 feet in height. The inlet mentioned above is between them.

The north point of the island, about 5 miles eastward of North-east bluff, rises to a hill about two-thirds of a mile within the point. The island is separated from the mainland on the south by a channel three-quarters of a mile wide in its narrowest part, which has not been completely examined.

Dangers.—The western shores of Simaddel appear to be clean, but the water is shallow, there being a depth of 2 fathoms in the entrance of the inlet mentioned. A sand patch and reef, which dry 4 feet and have $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms around, lie S. 73° W. $2\frac{1}{4}$ miles from North-east bluff.

General charts 287, 967, 2576, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

From the coast of Simaddel island reefs and dangers extend north and north-east to a distance of about $5\frac{1}{2}$ miles and eastward for 8 miles. On these reefs are many sand cays, two of which, Mabahók and Kalangaan, are especially conspicuous, being covered with trees whose tops are about 80 feet above the sea.

Anchorage may be had north-westward of Simaddel island in $5\frac{1}{4}$ fathoms, mud, with the summit of North-east bluff bearing S. 26° E., distant about $2\frac{1}{4}$ miles, and the northern extreme of the island S. 87° E. The approach to the anchorage from the northward is by a clear passage about 3 miles wide between the foul ground south-eastward of Mandiralla island and Bush island on the west and the dangers extending northward from Simaddel on the east; the depths decrease gradually from 11 and 12 fathoms in the channel outside to the anchorage, a distance of about 7 miles.

Directions.—When approaching the above anchorage from the north-westward, pass south-westward of Kukuban cay, and when it bears N. 2° W. steer S. 2° E., keeping it astern until the south-eastern extreme of Tigabu island bears N. 65° E., when a S. 17° W. course will lead to the anchorage.

From the eastward pass southward of Tigabu, and when the south-eastern extreme of that island bears N. 65° E. steer S. 65° W., keeping it astern until the trees on Kukuban bear N. 2° W., or the summit of North-east bluff bears S. 5° W., when steer S. 17° W. for the anchorage.

Sipindung (*Lat. $6^{\circ} 52'$ N., Long. $117^{\circ} 33'$ E.*) is a sand cay covered with bushes, the tops of which are about 20 feet high; it lies $4\frac{1}{2}$ miles S. 74° E. from Tigabu, and is on the west side of a coral reef about half a mile in extent. Dangers extend about two-thirds of a mile south and south-west of this islet, $2\frac{1}{2}$ miles in a north-north-east direction, and $1\frac{1}{4}$ miles to the north-west.

Between the Sipindung dangers and the reefs projecting eastward from Tigabu, there is a clear passage $1\frac{1}{2}$ miles in width.

South-west of Sipindung, at the distance of $1\frac{1}{4}$ miles, there is a group of reefs over half a mile in extent; between these and the other dangers above mentioned, also south-west of but nearer to Sipindung, there is a clear passage nearly three-quarters of a mile in width, through which lies the track from Mallawallé channel.

A small shoal, with less than 6 feet water, lies between the above group of reefs and the reefs extending from Simaddel island.

Sandy island is a small sand cay which sometimes covers, and is near the middle of a coral reef about half a mile in extent, off which detached patches extend 6 cables westward; it lies about $4\frac{1}{4}$ miles

General charts 287, 2576, 967, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

S.E. by E. of Sipindung, and between, at the distance of $2\frac{3}{4}$ miles in a west-north-west direction from Sandy island, there is a coral reef about a third of a mile in extent.

Beacon.—Sandy island is marked by a skeleton tripod beacon, 35 feet in height, painted red and black, with a basket cage on its summit.

Coral patches.—Three-quarters of a mile south-east of Sandy island is a coral patch of 4 fathoms. Another small patch of 4 fathoms lies $1\frac{1}{4}$ miles S. 52° W. from the beacon, and a patch of 7 fathoms S. 44° W. one mile from it, the track from Mallawallé channel lying between.

Leonan is a sand cay 5 miles S. 4° E. of Sandy island, and sometimes covers. It is situated on, and about one mile from the north-east end of, an extensive chain of reefs, which at this part extends 8 miles east-north-east from the shore of Simaddel island. There are four other small cays on this chain of reefs.

A small 2-fathoms patch lies 2 miles north-west of Leonan.

Reefs.—Beacon.—At the distance of $4\frac{1}{2}$ miles S. 39° E. from Sandy island there is a small coral reef, marked by an iron pole beacon with spherical topmark, painted red. Between this reef and that on which Leonan cay is situated there is a clear channel nearly 2 miles in width.

At about one mile N.E. by N. from the above beacon is the south-west end of some coral patches that dry, which extend north-eastward to the distance of about three-quarters of a mile.

Billean (*Lat. $6^\circ 37'$ N., Long. $117^\circ 46'$ E.*), situated 12 miles S. 52° E. of Leonan cay and 10 miles from the north-east coast of Borneo, is an island or cay on which there are a few bushes about 38 feet high. It is surrounded by coral reefs and dangers, which extend in a north-easterly direction from it to the distance of about $3\frac{3}{4}$ miles. A cay lies a quarter of a mile south-east of Billean.

Buoy.—A red and white vertically striped can buoy marks the 3-fathoms patch at the north-east extreme of the dangers extending from Billean, with that island bearing S. 40° W., distant $3\frac{3}{4}$ miles. The track recommended is northward and eastward of the buoy.

Billean North dangers.—About 9 miles northward of Billean, and $7\frac{1}{2}$ miles eastward of Leonan cay, is a group of coral reefs about 4 miles in extent east and west, upon which the least known depth is $1\frac{1}{2}$ fathoms. As these dangers have not been completely examined, they should be carefully avoided.

General charts 287, 2576, 967, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

Billean South dangers is another scattered group of coral reefs lying east-north-eastward of Billean cay, distant 7 to 11 miles; they consist of the following:—A small $2\frac{1}{2}$ -fathoms patch, situated 9 miles N. 47° E. from Billean cay; Sunbeam, a 3-fathoms patch, lying N. 70° E. 7 miles from Billean, with a similar shoal of 3 fathoms about a mile farther in nearly the same direction; a patch of $3\frac{1}{4}$ fathoms, situated N. 79° E. from Billean and N. 4° E. $7\frac{3}{4}$ miles from Lankayan island; and Paknam shoal, with less than 3 fathoms, in lat. $5^\circ 40'$ N., long. $117^\circ 56\frac{3}{4}'$ E. All these shoals are steep-to, but they probably have less water on them. The route marked on the chart has been followed with safety, but in such reef-strewn waters other dangers not charted may exist.

Tagipil (Lat. $6^\circ 33'$ N., Long. $117^\circ 43'$ E.) is a densely wooded and conspicuous small island situated $4\frac{1}{2}$ miles S. 36° W. of Billean cay; the tops of the trees are 184 feet high. Between Tagipil and Billean are two cays $1\frac{1}{2}$ miles apart.

Banku ru an cays are two small sand cays covered with trees about 50 feet high. Billean, Tagipil, Banku ru an, and the mainland are almost connected by a chain of coral reefs.

Five miles S. 27° E. from Billean is a sand cay, about 4 feet high, standing on a coral reef about half a mile in extent.

Marchesa bay is situated eastward of Simaddel island, and is comprised between the chain of reefs extending 8 miles east-north-eastward from that island, with Leonan cay near the extremity (page 162), and the chain of reefs just described as extending south-westward from Billean.

Between these chains of reefs the bay is from 10 to 12 miles wide, with depths in the entrance of from 11 to 17 fathoms, over mud or mud and shells, decreasing gradually south-westward toward the shore, off which sand and reefs dry from a half to $1\frac{1}{2}$ miles, and to $2\frac{3}{4}$ miles in the south-eastern corner of the bay.

In the south-western part of the bay, between Tanjong Kinulubaltan and Simaddel, is the entrance to the passage leading southward of that island. On the western side of the point the coast trends south-westward for $4\frac{1}{2}$ miles to the entrance of Sungi (river) Paitan, then westward and north-westward for about 7 miles, forming a bight $3\frac{3}{4}$ miles deep, in the western part of which is a wooded island 2 miles long north and south and three-quarters of a mile broad; there are also three small islands in the entrance to the Sungi Paitan. The southern and western parts of this bight have not been sounded. An extensive bank of sandy mud, dry at low water, lies abreast the entrance to the river; the northern edge of the bank is one mile

General charts 287, 2576, 967, 2660b, 1263.

Chart 1650, Mallawallé island to Lankayan. Var. 1° 50' E.

southward of the red cliff on Simaddel; the channel leading to the river appears to pass eastward of the bank.

A spit projects 2 miles north-eastward from Tanjong Kinulubaltan the outer part of which has 3 feet on it; the inner part dries for $1\frac{1}{4}$ miles. Beyond this and about 4 miles from the point in the same direction is a horseshoe-shaped bar about one mile across with $2\frac{1}{2}$ fathoms on it, which fronts the entrance to the channel. Within the bar there is a channel about 4 cables in width, with depths of from 4 to 10 fathoms, leading along the south-eastern side of Simaddel as far as the red cliff, beyond which it appears to become shoal. Southward of this channel are shallow banks.

Dangers in Marchesa bay.—A small rocky shoal covered by less than 6 feet water, and with a patch of $4\frac{1}{4}$ fathoms seaward of it, is situated $5\frac{3}{4}$ miles eastward of Tanjong Kinulubaltan and nearly 6 miles S. 2° E. from Leonan. A reef, dry at low water, lies $1\frac{1}{2}$ miles S. 30° E. and three similar reefs trend south-westward for a distance of $2\frac{3}{4}$ miles from the rocky shoal. The innermost of these reefs has a cay on it.

Coast.—From Tanjong Kinulubaltan the coast trends south-eastward 18 miles to Tanjong Siasib, where it turns southward for $11\frac{1}{2}$ miles to Tanjong Niug, and is wooded with casuarina trees, which in some places form peculiar clumps.

Also chart 1649, Lankayan to Sandakan harbour.

Lankayan, about 11 miles S. 57° E. of Billeau cay, is a sand cay covered with trees about 100 feet high, and is surrounded by a coral reef, which extends about $1\frac{1}{4}$ miles southward, three-quarters of a mile northward and eastward, and has a $3\frac{1}{4}$ -fathoms patch at 3 cables farther in the latter direction. A small detached coral reef lies $1\frac{2}{3}$ miles north from the cay; at 6 cables westward from this reef is a patch of 5 fathoms and at 2 cables northward a patch of 4 fathoms a quarter of a mile in extent. The depths for about $4\frac{1}{4}$ miles north-north-eastward of Lankayan are irregular, there being several patches, each about half a mile in extent, upon which the depths are from 3 to 5 fathoms, with from 12 to 15 fathoms between them.

A shoal with about 6 feet water on it lies N. 48° W. 9 cables from the south-western extreme of the cay.

Shoal ground, with depths of $3\frac{1}{2}$ to 4 fathoms, and 12 fathoms around, extends west-south-westward 2 miles from Lankayan.

Chart 1649, Lankayan to Sandakan harbour.

Beacon (Lat. $6^{\circ} 29' N.$, Long. $117^{\circ} 54' E.$).—There is foul rocky ground one mile in extent north-east and south-west, with depths of less than one fathom lying with its farther extreme S.W. by S., distant 3 miles from Lankayan. A beacon, consisting of a staff and globe

General charts 287, 2576, 967, 26606, 1263.

Chart 1649, Lankayan to Sandakan harbour. Var. 1° 50' E.

painted red and white in vertical stripes, has been erected S. 36° W. $2\frac{1}{10}$ miles from Lankayan to mark the north-eastern edge of the shoal ground. This shoal is a danger situated near the track of vessels passing westward of Lankayan.

Foul ground is charted $1\frac{1}{2}$ miles eastward of the beacon and 2 miles southward of Lankayan.

Four miles westward of Lankayan island there is a steep-to coral reef about a mile in extent north-north-east and south-south-west, the southern half of which dries.

Two shoals, with depths of $1\frac{1}{4}$ fathoms and 8 to 10 fathoms around, and together about one mile in extent north and south, lie with their northern extreme S. 40° W., distant $6\frac{4}{10}$ miles from Lankayan.

Kestrel shoal, about three-quarters of a mile in extent within the 10-fathoms limit, and with a depth of 2 fathoms near its centre, is situated 4 miles east of Lankayan.

Chart 1650, Mallawallé island to Lankayan.

Kechil reef, a coral patch about 4 cables in length, east and west, with a depth of $4\frac{1}{4}$ fathoms and deep water around, lies N.E. $\frac{5}{8}$ E. 7 miles from Lankayan island.

A patch of $5\frac{1}{2}$ fathoms, the existence of which is doubtful, is charted one mile south-south-eastward of Kechil reef.

Chart 1649, Lankayan to Sandakan harbour.

Bo aan (Lat. 6° 17' N., Long. 118° 5' E.), 192 feet high, the northernmost of a chain of islands which run in a north-north-east direction about $14\frac{1}{2}$ miles from the mainland, is nearly one mile in length north-east and south-west; it is surrounded by a coral reef about one-third of a mile wide on the north-western side, and has its lower parts densely wooded.

Si ba ung is a small coral reef lying W. $\frac{1}{4}$ N., distant $4\frac{1}{2}$ miles from the north part of Bo aan island. There are a few bushes 35 feet high on this reef.

Flying Fish rock, of small extent with deep water around, lies $2\frac{1}{2}$ miles east of Bo aan island, and has $2\frac{3}{4}$ fathoms on it at low water; another small shoal of $2\frac{3}{4}$ fathoms lies about three-quarters of a mile south-westward of Flying Fish rock, with the summit of Bo aan bearing N. 78° W., distant $2\frac{1}{10}$ miles.

Lihiman lies $2\frac{3}{4}$ miles south of Bo aan island, is about two-thirds of a mile in length north-east and south-west, densely wooded, and 172 feet in height. Lihiman island is surrounded by a coral reef which extends north-eastward about two-thirds of a mile, and has upon it a small islet 30 feet high.

General charts 287, 2576, 967, 2660b, 1263.

Chart 1649, Lankayan to Sandakan harbour. Var. 1° 50' E.

Both Lihiman and Bo aan are mud volcanoes, which appear to have been active within the last few years.

Langaan is a small wooded island 120 feet high, situated on the south-west edge of an extensive coral reef, projecting $1\frac{1}{4}$ miles north-eastward. Eastward of Langaan, on the edge of the reef, is a sand-bank 2 feet high. A coral patch, apparently of small extent, having a depth of 4 fathoms and possibly less, lies E. by S. $\frac{3}{4}$ S. $4\frac{1}{2}$ miles from Langaan island, and nearly one mile north of the 4-fathoms is a patch of 9 fathoms.

Johnston rock, a coral patch of $2\frac{1}{4}$ fathoms, situated N.E. by E. $2\frac{3}{10}$ miles from the south-east extreme of Langaan, lies near the middle of shoal ground with depths under 10 fathoms, extending about a mile in an E.N.E. direction.

Great and Little Bakkungaan are two wooded islands, fringed with coral, 190 and 157 feet high, lying respectively about $1\frac{1}{2}$ and 3 miles south-westward of Langaan.

Detached coral reefs extend from Great Bakkungaan north-westward $1\frac{1}{2}$ miles, and westward and eastward to the distance of a mile. A coral patch with 8 feet water over it is reported to exist in the channel between Great Bakkungaan and Langaan.

Silingaan is a small wooded island, 139 feet high, fringed with coral to the distance of a quarter of a mile, lying 3 miles southward of Lihiman. About one mile east of Silingaan is a coral reef, half a mile in extent, on the south-eastern edge of which is a sand cay, awash at high water.

Gulisaan is a small islet on the south edge of a coral reef three-quarters of a mile in extent east and west, and lies about $1\frac{1}{4}$ miles S. by W. of Silingaan; on it is a clump of conspicuous trees 76 feet high.

Libarran (*Lat. 6° 7' N., Long. 118° 1' E.*) is a wooded island, 140 feet high, nearly $1\frac{1}{2}$ miles in length east-north-east and west-south-west, lying 3 miles north-eastward of Tanjong Pandaras and about the same distance within the 5-fathoms contour line. From it a coral reef extends eastward $1\frac{1}{4}$ miles with Black rock, 8 feet high, near its end, and White rock, 6 feet high, $3\frac{1}{2}$ cables south-westward of Black rock; and also westward for two-thirds of a mile, having Round islet close to its extreme. North-westward 2 cables from Round islet is a rock that dries 2 feet, and at 4 cables north-eastward is Tree rock, 20 feet high.

Clotilde rock, in lat. 6° 14' N., long. 118° 23 $\frac{1}{4}$ ' E., is a small coral reef, part of which stands 2 feet above high water; there are depths of 20 and 23 fathoms of water close-to around it.

General charts 287, 2576, 1868, 2660b, 1263.

Chart 287, Gaya bay to Sandakan harbour. Var. 1° 50' E.

Laurel rock is of small extent, stands 6 feet above high water, and is situated in lat. $6^{\circ} 9\frac{1}{2}'$ N., long. $118^{\circ} 29'$ E.

Baguan is a densely wooded island, 228 feet high, lying S.S.W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles from Laurel rock. From the north point of it discoloured water has been seen to extend a considerable distance in the direction of Laurel rock; the passage between Baguan and the rock should therefore not be taken.

Rock reported.—In 1907, the master of the s.s. *Progress* reported that his vessel struck on a pinnacle rock with a depth of 3 fathoms over it off the north-east coast of Borneo, at a distance of 2 miles N. 50° W. from Baguan island.

Chart 1649, Lankayan to Sandakan harbour.

Taganak (Lat. $6^{\circ} 5'$ N., Long. $118^{\circ} 19'$ E.).—This island, 554 feet in height, is rather more than one mile in length north-north-east and south-south-west, and is surrounded by a coral reef to the distance of about 4 cables; it is densely wooded. Strong currents are reported to exist in its vicinity.

Taganak patches, of from 5 to 10 fathoms, with greater depths between them, are about $2\frac{1}{2}$ miles in extent in an E. by N. and opposite direction, and lie with the central and shoalest part W.N.W., distant $4\frac{1}{4}$ miles from the south-west end of Taganak island. This position is occasionally marked by tide ripples.

Gubbins rock is a dangerous patch of coral with about 6 feet water on it and steep-to, lying S.E. $\frac{1}{2}$ S. $7\frac{3}{4}$ miles from Little Bakkungaan.

Chart 287, Gaya bay to Sandakan harbour.

LABUK BAY.—Labuk bay, situated about 20 miles north-westward of Sandakan, is about 19 miles wide between Pulo Pura-pura and Tanjong Pandaras, and about 16 miles in depth to Labuk river, in the south-west corner of it. The greater part of the bay is shallow, and blocked by numerous sandbanks, which renders the navigation dangerous even for boats; but there is a narrow channel on the north-western side leading to the Bongaya river, and one on the south-eastern side affording a passage to Labuk river. The western side of the bay is densely wooded, with numerous creeks; and the south-east side is fringed by islets and rocks extending some distance off-shore.

Tanjong Niug is a well-defined point covered with trees, about 150 feet high, just southward of Pulo Pura-pura on the north-west side of the bay. See view c, at page 134.

About 8 miles north-westward of Tanjong Niug are Quoin and Flat hills, 650 and 630 feet high respectively.

General charts 287, 2576, 1868, 2660b, 1263.

Chart 287, Gaya bay to Sandakan harbour. Var. 1° 50' E.

Islets.—A chain of islets, of which Torongohok is the northern, lie in the south-western part of the bay. The northern portion of Torongohok is wooded with casuarina trees about 140 feet in height, forming a prominent object when approaching from the north-eastward.

Pulo Gusong is a small sandy islet about 2 feet in height on the eastern extremity of a large sandbank near the middle of the bay, and, being devoid of trees, is difficult to distinguish.

Chart 1649, Lankayan to Sandakan harbour.

Off Tanjong Pandaras are some low islets, merely clumps of mangroves on the fringing reef; on Pulo Bankawan or Low island, the outer one, the trees are 100 feet high.

Pulo Tikus is a wooded pyramidal island, 234 feet in height, lying one mile westward of Tanjong Pandaras; about half a mile northward of it there is a small rock nearly awash at high water.

Chart 287, Gaya bay to Sandakan harbour.

LABUK RIVER (*Lat. 5° 55' N., Long. 117° 40' E.*).—The mouth of Labuk river, which for a few miles is named the Kolapis river, is 21 miles south-westward of Tanjong Pandaras; the entrance is 5½ cables wide, with a depth of 5 fathoms. The Bongaya river and several streams of no importance to trade enter the sea in the north-west portion of the bay.

Bar.—The best channel to Labuk river is between Libarran island and the low islets off Tanjong Pandaras; the least water is on the bar between Pulo Gusong and Sungi Gum-gum on the south-eastern side of the bay, on which there is a depth of 1½ fathoms.

Directions.—From the eastward, having passed Gubbins rock, course must be shaped to pass between Libarran and the low islands off Tanjong Pandaras, avoiding the rocks which lie off the reef extending about half a mile southward of Libarran island; and when Round islet (westward of Libarran) is in line with Gulisaan, bearing N. 56° E., course must be altered to S.W. by W. These islets in line astern, lead clear and westward of the islets and rocks off Tanjong Pandaras, and the same course continued, allowing for tide, leads over the flats, in 1½ fathoms at low water springs. When the water deepens course may be shaped to pass about three-quarters of a mile westward of Tanjong Semawang, from whence to the mouth of Labuk river there is a depth of from 3¼ to 5 fathoms.

Tides.—It is high water, full and change, in Labuk bay at 9h. 30m. during the period of the south-west monsoon in the China sea; springs rise 8 feet, neaps 5 feet. The maximum strength of the

General charts 287, 2576, 2660b, 1263.

Chart 287, Gaya bay to Sandakan harbour. Var. 1° 50' E.

ebb observed in the river was 3 knots. In the Labuk river the tide is felt for a distance of about 20 miles from the entrance.

Supplies.—There is a village on Pulo Tetabuan and another on the islet close westward of Pulo Linkabo, in the south-western part of the bay, but no supplies were obtainable, neither was any fresh water met with. The village of Balmoral is shown on the chart within the entrance to the Kolapis river, on the south bank.

Chart 1649, Lankayan to Sandakan harbour.

COAST.—From Tanjong Pandaras (*Lat. 6° 4' N., Long. 117° 59' E.*) the coast takes a south-easterly direction for 16 miles to Sandakan harbour, and consists of low land, densely wooded and intersected by numerous streams.

Plan 950, Sandakan harbour.

Nunuyon Laut and Nunuyon Derat are two low wooded islands lying about 2 miles north-west of Bahala; they are almost connected with the mainland, and are about 3 miles within the 3-fathoms contour line.

Plan of Sandakan anchorage on 950.

Bahala is an island about 2 miles in length, north and south, with a maximum breadth of 6 cables lying on the north-west side of the entrance to Sandakan harbour. The northern part of it is low, and very narrow, the southern rises in two conspicuous hills, 591 and 549 feet in height; these hills slope gradually to the westward, but their eastern faces are imposing precipices with two light red streaks running perpendicularly from the top to the bottom, by which the island may be recognised. *See view on chart 1649.*

Chart 950, Sandakan harbour.

SANDAKAN HARBOUR.—Aspect.—This expansive harbour is $1\frac{1}{4}$ miles wide at the entrance, between Bahala island and Tanjong Aru, the broad point opposite to the south-east. From here it gradually increases in width, forming a spacious basin north of Pulo Bai, more than 3 miles in diameter, which constitutes the usual anchorage. The harbour extends south and west of Pulo Bai to a distance of 15 miles from the entrance, but the only part surveyed is that north of Pulo Bai and Sapa Gaya bay, situated on the southern shore. From the entrance to the end of Sandakan bay the depths vary from 16 to 3 fathoms. Some thirteen rivers run into the bay.

The eastern side of the harbour entrance is formed by a large island, low and densely wooded, and separated from the main coast by a channel named Trusan Duyon. From the shore eastward of the entrance an extensive flat projects seaward, the northern point of which, in a depth of 3 fathoms, lies 8 miles north-east of Tanjong Aru; the 5-fathoms limit is 2 miles farther out.

General charts 1649, 287, 2576, 2660b, 1263.

Chart 950, Sandakan harbour. Var. 1° 50' E.

The northern shore rises to many summits conspicuous from seaward, of which the highest and centremost is **Bukit Merkarah** (Three-peaked hill), 850 feet high. These hills slope gradually on their northern and western sides, and are generally steep on their southern and eastern sides. The jail is white with a red roof, and is conspicuous, with two flagstaffs south-west of it. In the centre of the town of Sandakan, near the Government offices, is a conspicuous white clock tower (*Lat. 5° 50' N., Long. 118° 7' E.*).

Bathing is dangerous, as crocodiles abound.

Bar.—A bar of mud, about $3\frac{1}{4}$ miles across, within the 5-fathoms limits, with a least depth of $3\frac{3}{4}$ fathoms, but with 4 fathoms at low water on the course recommended, lies from 6 to $9\frac{1}{2}$ miles north-eastward of the south point of Bahala. *H.M.S. Monmouth*, drawing 25 feet, found a least depth of 29 feet on crossing the bar near high water springs, when entering and leaving Sandakan harbour, March, 1910.

Plan of Sandakan anchorage on chart 950.

Dangers.—**Atjeh rock**, with $2\frac{1}{2}$ fathoms at low water, and the only detached danger off the town of Sandakan, lies $3\frac{1}{2}$ cables S. 70° E. from the eastern extremity of the Government pier.

Buoy.—Atjeh rock is marked by a red and white vertically striped can buoy, with staff and cage.

Allard bank nearly fills the bight between the Government pier and Pavitt point, leaving a small pocket at its eastern end, where the depth is $2\frac{1}{2}$ fathoms at low water.

Plan 950 Sandakan harbour.

Elton bank is an extensive area of shallow water extending from the north shore of Pulo Bai for a distance of nearly 2 miles.

Beacon.—A white tripod beacon, 20 feet high, is erected on a rock 2 feet above high water, near the eastern extreme of the rocks bordering the channel, which extend 2 cables eastward of Pulo Bai.

Borneo rock, beyond which the channel east of Pulo Bai has not been surveyed, has a depth of 4 feet water, and lies 6 cables W. $\frac{1}{4}$ S. from the west extreme of Tighowis island, in the fairway southward from Sandakan harbour. It is marked by a red can buoy. The best channel is close westward of the rock.

Plan of Sandakan anchorage on 950.

Anchorage.—The most convenient anchorage is about 3 cables southward of the Government pier in a depth of 8 fathoms, mud.

Plan 950, Sandakan harbour.

Directions.—When in a position about 10 miles north-eastward of the entrance to Sandakan, bring the cliff on the south-eastern side of Bahala to bear S.W. $\frac{1}{2}$ S., and steer for it; this leads over the flats

General charts 1649, 287, 2576, 2660b, 1263.

Plan 950, Sandakan harbour. Var. 1° 50' E.

in the approach to Sandakan harbour in a depth of not less than 4 fathoms, and $1\frac{3}{4}$ miles north-westward of the shoal projection from the south-eastern shore. As soon as the bar is crossed and depths of $5\frac{1}{2}$ or 6 fathoms obtained, alter course a little southward and steer to pass 4 or 5 cables eastward of the south end of Bahala, and thence to the anchorage, avoiding Atjeh rock. See Bar, on page 170.

Sandakan (formerly Elopura) (*Lat. 5° 50' N., Long 118° 7' E.*), the principal town and head-quarters of the North Borneo Company, is built on the north shore of Sandakan harbour, three-quarters of a mile within Tanjong Papat. The shore between Fort Pryor and the Government pier is fronted by wooden houses built on piles, principally consisting of Chinese shops, behind which, on terra firma, and on rising ground are the Government offices, &c. There is an Anglican and a Roman Catholic church, and a Government hospital for Europeans.

The population is about 5,000. An American Consul and a German Vice-Consul reside here.

Communication.—Frequent communication is kept up between Sandakan and the other ports of North Borneo by small steamers of the Sabah Steamship Company.

A North German Lloyd steamer maintains a fortnightly service with Singapore, calling at other North Borneo ports *en route*, and monthly between Singapore, Sandakan, Darvel and Sibuko bays, Sulu, and Samboanga. In 1910 an irregular service to Hong Kong was maintained by a North German Lloyd steamer, and one belonging to Jardine, Mathieson, & Co., at about three weeks' interval.

Telegraph.—Sandakan is in telegraphic connection with Lahat Datu, Kudat, Jesselton, and Labúan, thence with Hong Kong, Singapore, and Europe by submarine cables.

Pier.—There is a substantial wooden pier, 365 feet long, alongside which the depths are from 25 to 27 feet at low water; it is the property of the Government.

At about 3 cables to the north-eastward there is another pier, which extends into a depth of 11 feet at low water. Railway lines are laid along it from the foundry and ship-building yard at its inner end. There is a travelling crane to lift 3 tons. Fresh water is laid on in pipes.

All vessels carrying goods must load and discharge at the Government wharf, unless written permission to do so elsewhere has been obtained from the Superintendent of Customs.

Harbour dues are 3 cents per ton.

General charts 1649, 287, 2576, 2660b, 1263.

Plan of Sandakan anchorage on 950. Var. 1° 50' E.

Harbour light (*Lat. 5° 50' N., Long. 118° 7' E.*).—A *fixed* light is exhibited from a wooden pile structure, 28 feet high, situated near the centre of the Government pier, which light shows *red* to the eastward and *green* to the southward and westward; it is generally somewhat difficult to make out.

Tides and tidal streams.—It is high water, full and change, in Sandakan harbour at Noon; springs rise 8 feet, neaps 3½ feet. The tidal streams turn with the times of high and low water by the shore, the ebb attaining a maximum velocity of 2 knots an hour at springs, and the flood a maximum velocity of 1½ knots at springs.

Tide signals.—A cone and ball tide signal is hoisted on a small mast on the centre of the Government pier to show the state of the tide to vessels approaching it; cone, point down, signifies flood tide; cone, point up, ebb tide; ball, slack water.

Trade.—Most of the trade is carried on through Singapore with Europe and Hong Kong. The exports comprise mostly jungle produce, catch, cocoanuts, timber, sago, tobacco, rattan, and india-rubber. The imports include cloth, hardware, manufactured goods of all kinds, rice, oil, sugar, and tinned provisions.

Coal.—A wharf has been erected by the Cowie Harbour Coal Co., immediately to the westward of the Government pier previously mentioned, with a storage capacity of 1,000 tons; a small stock is kept. The wharf, alongside which vessels may berth, has from 21 to 26 feet alongside at low water springs. Reclamation was in progress (1910) westward of this pier, where it is intended to maintain a stock of upwards of 2,000 tons of coal.

Water.—Supplies.—Water for boilers can be obtained from a hydrant on the Government pier; the charge is 65 cents per ton. Beef, bread, and vegetables can be regularly obtained in small quantities; fish can be obtained.

Repairs.—There is a foundry and shipbuilding yard, and small repairs can be undertaken; there is also a patent slip, for particulars see Appendix II. Lighters up to 100 tons displacement have been built here.

Port limits.—The limits of the port are: Sandakan bay bounded by a line drawn in an E.S.E. direction from north point of Bahala island to the most easterly extremity of Tanjong Aru, on the south side of the bay, together with the rivers and arms thereof as far as navigable.

Weather.—See Meteorological table, page 713.

Charts 1650, 1649.

DIRECTIONS.—Mallawallé channel to Sandakan.

—The route now generally used by vessels proceeding to Sandakan is by the Mallawallé channel.

General charts 1649, 287, 2576, 2660b, 1263.

Charts 1650, 1649. Var. 1° 50' E.

The track recommended lies midway between Mallawallé island and Passage reef, and passes about 3 cables northward of the cay (awash at low water) situated $2\frac{3}{4}$ miles eastward of the latter. Hence to Tigabu the track lies either eastward of Kukuban island and the shoals south-eastward of it, or westward of this central group, until $1\frac{1}{2}$ miles south-westward of Tigabu, when Sipindung island may be steered for bearing East, until Tigabu north-east extreme is in line with the west extreme of Mallawallé island. This latter mark leads between the shoals extending to the southward of Sipindung and the shoal water off the north-east edge of the small coral reef situated $1\frac{1}{2}$ miles south-westward from that island.

Another good mark leading through this, the narrowest part of the channel, is a sand cay with a few bushes on it lying one mile northward of Tigabu island, in line with the eastern summit of Mallawallé island N. 49° W. ; which mark also leads past Sandy island and between the Leonan reef and the detached reef north-eastward of it marked by a beacon.

Billean island (*Lat. $6^{\circ} 37' N.$, Long. $117^{\circ} 46' E.$*) should be rounded at a distance of from $4\frac{1}{2}$ to 5 miles, and the track then lies between Lankayan reef and the beacon on the north end of the shoal about $1\frac{1}{4}$ miles south-westward of it, passing over or near 4-fathoms patches westward of Lankayan. Or, vessels could pass southward of the shoal marked by the beacon in apparently better water, but it has not been surveyed in detail; special care is required at this part. The track now lies eastward of Si ba ung, and of the reef extending $1\frac{1}{4}$ miles east of Silingaan; and westward of Lihiman, Little Bakkunga-an, and the dangerous Gubbins rock situated $7\frac{3}{4}$ miles S.E. $\frac{1}{2}$ S. from the last-mentioned island.

CAUTION.—The route above is marked on the chart, and has been followed with safety, but there may be less water than shown on some of the shoals and in such reef-strewn water other dangers not charted may exist.

It should be borne in mind also, that no reliance can be placed on the position of sand cays which have no vegetation on them; the action of the sea frequently causes them to shift considerably, and even disappear.

The beacons are difficult to make out, and are liable to be washed away.

Tides and tidal streams.—At Tigabu, it is high water, full and change, at 11h. 38m.; springs rise $6\frac{1}{2}$ feet; neaps 4 feet, but are exceedingly irregular.

In the Mallawallé channel the flood runs to the eastward and the ebb to the westward at springs with a velocity of about $2\frac{1}{2}$ knots.

On the coast between Mallawallé and Sandakan, no regular tidal

General charts 287, 2576, 2660b, 1263.

Charts 1650, 1649. Var. 1° 50' E.

stream was perceptible, but when the north-east monsoon blew steadily there appeared to be a constant set to the N.W.

Charts 287, 1868.

COAST.—From Sandakan harbour the coast trends east-south-eastward for about 60 miles to Tanjong Unsang, whence it gradually turns southward for about 11 miles to Dent haven. This coast is very low alluvial land, covered with dense jungle and forest, principally casuarina trees from 150 to 180 feet high, fronted by a narrow sandy beach. Between Sandakan and Kinabatangan river, situated in an east-south-east direction, the coast is intersected by numerous streams, some of which are said to lead into the river and to be navigable for boats.

Chart 1868, Taganak to Tawi Tawi.

Landmarks.—About 11 miles eastward of Sandakan there is a conspicuous tree 227 feet high (not distinguishable in 1907), on the eastern point of the entrance to Mamuyon river; and 6 miles farther eastward the Abai clump 185 feet high, which from the eastward makes as an island, but is not so easily distinguished from the westward. Kinabatangan hills, 963 feet in height, situated about 10 miles inland, appear from seaward as a long range with a slight peak; view on chart 2576 and view B on chart 1868. Aguja peak, 638 feet high, from the eastward appears as a double cone. Confusion hill, from the north-eastward shows a round top. Notch hill, 803 feet in height, the most conspicuous of the hills in the vicinity of the Kinabatangan river, has a sharp fall near the summit; view on chart 2576 and view B on chart 1868.

Mount Hatton, 1,990 feet in height, situated about 15 miles south-eastward from Notch hill, is the most conspicuous mount on the coast, appearing with a sharp peak from all directions; view on chart 2576 and views A and B on chart 1868. Ragged hill, 1,455 feet high, about 7 miles westward, makes from the eastward as two cone-shaped hills.

Bagahak mountain, 2,740 feet in height, in the centre of a long sloping range, is seen in clear weather beyond Mount Hatton. See view on chart 2576 and views A and B on chart 1868.

Kinabatangan river (*Lat. 5° 39' N., Long. 118° 37' E.*).—The mouth of the Kinabatangan is 30 miles eastward of Sandakan. Driftwood point, the east point of entrance, is wooded, and may be distinguished at the distance of 15 miles from the coast, making as a sharp and well defined point.

From the entrance the river trends S.W. and then S. by W. for 5 miles to Dewhurst bay, which is 3 miles long and one mile broad,

General charts 2576, 2660b, 1263.

Charts 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

having depths of from one to 2 fathoms. The main branch turns westward at 5 miles from the entrance, from whence it was examined for a distance of 6 miles; depths of from $1\frac{1}{2}$ to 6 fathoms were found, and the river at this distance was 300 yards wide, with a depth of $2\frac{1}{2}$ fathoms. No villages were seen, and but few boats; no fresh water was obtainable.

Bar.—The river between the entrance points is 6 cables broad, with depths of from 4 to 5 fathoms; the bar, which extends $3\frac{1}{2}$ miles seaward, has a depth of $1\frac{1}{2}$ fathoms at low water springs. Vessels drawing more than 8 feet should not attempt to cross the bar without a boat ahead, as the tides are much influenced by the winds, rendering the time of high water uncertain.

Tides.—See page 176.

Royalist rock, a coral shoal 4 cables long north-north-east and south-south-west, with a least depth of 6 feet at low water springs near its south-west end, and 18 fathoms around, lies with Driftwood point, Kinabatangan river, bearing S.S.W., distant $4\frac{3}{4}$ miles.

Nymphe reef, about a mile in extent, with a depth of one foot at low water springs, is formed of coral and sand, and lies $1\frac{1}{2}$ miles N.N.E. of Royalist rock just within the 20-fathoms contour line. Patches of $5\frac{3}{4}$ and 7 fathoms lie between it and Royalist rock. Being within the limit of discoloured water from Kinabatangan river, Nymphe reef is seldom seen, but is marked by a slight ripple. It breaks in heavy weather.

Clearing marks.—Abai clump, bearing W. by N. $\frac{1}{4}$ N., leads southward of Royalist rock and Nymphe reef, and the mouth of Kinabatangan river bearing S.W., leads eastward of them.

Pegasus reef (*Lat. 5° 46' N., Long. 118° 50' E.*), situated 14 miles N.E. by E. from Driftwood point, nearly 2 miles in length north and south, by $1\frac{1}{2}$ miles in width, and with a least depth of 3 feet, is composed of live coral with patches of sand. Depths of from 26 to 30 fathoms are found at the distance of one mile from the shoal heads; the discoloured water on the reef can be made out from the masthead.

Segama river.—The mouth of the Segama river is 14 miles south-eastward of the Kinabatangan, the coast between being covered with jungle, fronted by a belt of grass and bushes; between the entrance points the river is $5\frac{1}{2}$ cables in width, with a depth of $2\frac{1}{2}$ fathoms. From the entrance the river trends S. $\frac{1}{2}$ E. for about 3 miles, with an island in it; thence it splits up into several creeks, which are narrow, with depths of from 2 to 3 fathoms.

General charts 2576, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

Bar.—The shallow flat fronting the river extends about 3 miles from the coast; the least depth over which, leading to the entrance, is 9 feet at high water springs. Vessels entering should send a boat ahead, as the tides are irregular.

Marowop river.—The mouth of this river, $8\frac{1}{2}$ miles south-eastward of the Segama, is 7 cables wide, with depths of from 3 to 5 fathoms between the entrance points. Near the eastern entrance point there is a conspicuous tree, which, however, could not be distinguished in 1907.

Bar.—There is a depth of $1\frac{3}{4}$ fathoms on the bar at low water spring tides, but caution is necessary in crossing, as the sea breaks on it with S.E. winds.

From the entrance, the river trends southward for 3 miles, to Evans island, where it divides into numerous branches.

Tangusu bay is a shallow bight south-westward of Tambisan island.

Rock.—A rock with 4 feet on it at low water springs, lies nearly one mile off the shore reef with Tambisan peak bearing N.E. $\frac{3}{4}$ E. distant 2 miles.

Tambisan island (*Lat. 5° 27' N., Long. 119° 7' E.*), 3 miles in length, east and west, by $1\frac{1}{4}$ miles in breadth, is about 220 feet in height, and covered with trees. The west point is easily distinguished from seaward, but the east point is low; the island is fronted by a coral reef to the distance of three-quarters of a mile. A narrow channel, which is only navigable by small craft, separates the island from the mainland.

Tides and tidal streams.—It is high water, full and change, at Kinabatangan river at 11h. 17m.; springs rise $5\frac{1}{2}$ feet; at Tambisan island at 10h. 52m.; springs rise $3\frac{1}{2}$ feet. Between Sandakan and Tambisan the flood stream sets to the north-westward, and the ebb to the south-eastward; the tidal stream is slight, rarely as much as one knot.

Between Tambisan and Dent haven the tidal streams are more strongly marked; the flood sets to the northward and the ebb to the southward at the rate of from 2 to 3 knots per hour.

Current.—At the distance of 10 miles from the coast, during the south-west monsoon, the regular south-east current, from one to 2 knots an hour, makes itself felt, and the north-westerly (flood) set is not experienced, only a slackening of the current during flood tide.

OFF-LYING BANKS.—**René shoal**, composed of coral and sand, is $5\frac{1}{2}$ miles in length in a north-west and south-east direction, and about 2 miles in breadth within the 20-fathoms contour line.

General charts 928, 2576, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

From the least depth of 3 fathoms, the peak of Tambisan island bears S.W., distant $4\frac{1}{2}$ miles.

Gem reef, situated 3 miles northward of the north-west end of René shoal, is a patch of coral and sand, 3 miles in length, north-west and south-east, and 2 miles in breadth, with a depth of 3 feet near its centre. From the shoal heads Tambisan peak bears S. $\frac{3}{4}$ W., distant about $8\frac{1}{2}$ miles.

Magpie bank.—This extensive bank of rotten coral lies with its south-eastern end about 6 miles northward of Gem reef; within the 20-fathoms contour line, it is 7 miles in length in a north-west and south-east direction, and $2\frac{1}{2}$ miles wide. With the exception of the western side of the bank, the depths increase suddenly to upwards of 100 fathoms; on the western side the 100-fathoms line extends about 6 miles westward from the depth of 10 fathoms in the centre of the bank. The centre of the bank, with a depth of 10 fathoms, lies N. $\frac{1}{4}$ W., distant $17\frac{1}{2}$ miles from Tambisan peak; a patch of 11 fathoms lies 3 miles westward, and an isolated patch of 9 fathoms, the least water found on the bank, lies $1\frac{1}{2}$ miles south-westward of this position.

Sunday bank, lying north-eastward of Magpie bank, and distant about 23 miles N. $\frac{1}{4}$ E. from Tambisan peak, is somewhat circular in shape, and about $3\frac{1}{2}$ miles in diameter, north-east and south-west within the 20-fathoms contour line; it has depths of from 9 to 14 fathoms upon it, and very deep water around. The shoalest part known (9 fathoms, coral bottom) lies near the north-western edge.

Normanby bank, about 4 miles in length north and south, and $1\frac{1}{2}$ miles in width, within the 10-fathoms contour line, has depths of 6 to 10 fathoms, coral, and very deep water around, within about half a mile from the edge. The shoalest part lies near the southern end. The depths between this bank and Sunday bank, 2 miles westward, are upwards of 100 fathoms.

Sentry bank (*Lat. 5° 40' N., Long. 119° 18' E.*), of sand and coral, is about $6\frac{1}{2}$ miles in length north-north-west and south-south-east, and about 4 miles wide within the 20-fathoms contour line; it has depths of from 7 to 20 fathoms, the shoalest spot ascertained being about one mile within its south-western edge in the position given.

The 100-fathoms line is within half a mile of the western and south-western edges of the bank, within $1\frac{1}{2}$ miles of the eastern edge, but has not been defined towards the north.

Currents.—During the two days that the *Egeria* was at anchor on Sentry bank (in the month of August), the current was observed

General charts 928, 2576, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

to set almost constantly between N.E. and S.E., varying from three-tenths of a knot to $1\frac{1}{2}$ knots an hour, but the tidal streams appeared to exercise a decided influence on the strength and direction of the current.

Tidal streams.—The flood stream was observed to set to the south, and the ebb to the north.

Talamtan bank.—See page 296.

Coast.—From Tambisan island the coast trends E.S.E. for $3\frac{1}{2}$ miles to Tanjong Unsang, where it turns gradually to the southward for 11 miles to Dent haven. It is low, covered with swamp and dense jungle, and fronted by a narrow fringe of coral, which is steep-to.

Tides.—It is high water, full and change, at Tanjong Unsang at 8h. 0m.; springs rise $3\frac{1}{2}$ feet.

Plan 1781, Dent haven.

DENT HAVEN (*Lat. 5° 16' N., Long. 119° 15' E.*) is nearly 2 miles wide between Reef and Mangrove points, and affords good anchorage in the south-west monsoon, in about $3\frac{1}{2}$ to 4 fathoms, sand and mud; but a slight swell sometimes sets into the bay. The southern part of the bay, near the Mangrove islands, is foul. Three brackish streams run into Dent haven; the two northern are dry across their entrances at low water. In the southern stream, boats can find good shelter inside the spit, in deep water, the entrance being through a narrow channel in the reef. The whole coastline is but the barrier of a great swamp, filled with trees, mostly dead or blasted.

Mangrove point, the southern entrance point of the haven, is the northern end of a mangrove-covered island lying close to the land and fringed on its northern and eastern sides by a narrow reef.

Banks.—Reef point, the northern point of the haven, is foul for two-thirds of a cable from the shore; and a sandbank awash at low water lies 3 cables north-eastward from the point. To the northward of Reef point, within the 5-fathoms line, which extends to a distance of from 6 to 7 cables from the shore, the soundings are very irregular.

Hull rock, situated $1\frac{9}{10}$ miles E.N.E. from Reef point, has only 4 feet of water over it, and breaks at times. It is on a long narrow bank of hard sand with from one to 5 fathoms on it, which stretches nearly $1\frac{1}{4}$ miles northward and one mile southward from the rock.

Between the shore bank and the northern tongue of Hull rock bank there is a channel half a mile wide with 6 to 7 fathoms, but it is obstructed by a sandy patch about one cable in diameter and covered by 3 to $3\frac{1}{2}$ fathoms water; this channel is not recommended.

A small patch of $4\frac{1}{4}$ fathoms, with depths of 6 to 9 fathoms around, lies 6 cables W. by S. $\frac{1}{2}$ S. from Hull rock.

General charts 1868, 928, 2576, 2660b, 1263.

Plan 1781, Dent haven. Var. 1° 50' E.

Hardy patch, a narrow coral shoal $1\frac{1}{2}$ cables in extent, with a least depth of 3 fathoms on it and $6\frac{1}{2}$ to 10 fathoms around, lies in the approach to Dent haven; from it Mangrove point bears W. by S. $\frac{3}{4}$ S., distant $2\frac{2}{10}$ miles. The shoal is marked by strong tide rips over it and the water about it is usually discoloured.

This shoal constitutes a danger to ships passing Dent haven at night or in thick weather, but it may be avoided by keeping outside the 20-fathoms contour line, which passes about $1\frac{1}{4}$ miles eastward of it.

Anchorage.—Between Reef point and Mangrove point the general depth is from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms over a sand and mud bottom, the deeper water and less irregularity of bottom being found in the northern part of the bay. There are two patches of $2\frac{3}{4}$ and 3 fathoms N. by E. of Mangrove point, situated respectively 4 cables and 8 cables from that point.

Directions.—Coming from the northward, to avoid Hull rock and bank, the extreme point southward of Dent haven should not be brought to the southward of S.W. by S. until the southern end of the long sandy beach in the bay bears W. by S. $\frac{1}{2}$ S., when it may be steered for, anchoring as convenient.

Supplies.—There is no village in Dent haven, but natives occasionally visit the place. Fish may be obtained with the seine near the beach southward of the southern stream. Bathing is dangerous on account of alligators.

Tides.—It is high water, full and change (August), at Dent haven at 6h. 34m.; springs rise $3\frac{1}{2}$ feet.

Chart 1868, Taganak to Tawi Tawi.

Tidal streams.—Between Dent haven and Tanjong Labian (*Lat. 5° 8' N., Long. 119° 13' E.*) the streams run strongly, from $1\frac{1}{2}$ to 3 knots at times, flood to the south and ebb to the north, but the tidal streams are extremely variable in strength hereabouts, and there is no certainty as to their direction. Occasionally the stream was observed to run strongly in one direction for one or two days, and then in the opposite direction for a day, for no reason that could be assigned; at other times the streams changed approximately at high and low water by the shore.

Further westward on the north shore of Darvel bay the tidal streams are weaker, and run about one knot per hour at springs, flood to the westward and ebb to the eastward.

In Dent haven the tidal stream begins to set to the northward 3 hours before high water, and to the southward 3 hours before low water; it appears probable that this is an eddy.

General charts 1868, 928, 2576, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

COAST.—From Dent haven the coast curves very gradually for 7 miles to the southward and south-westward, forming, however, a definite point at Tanjong Labian. In the vicinity of Dent haven the coast is swampy and fringed by mangroves, but as it curves to the southward and westward the swamp gives way to a hard sand beach closely backed by jungle, through which, however, it is not difficult to force one's way, and there are along this coast occasional comparatively open spaces where deer may frequently be found.

Several small streams find their way to the coast, but there are no rivers.

Tide rips.—From Gem reef to Sibutu passage frequent and sharply-defined tide rips occur, which have the appearance of shoal water.

Chart 928, Sulu archipelago.

SIBUTU PASSAGE separates the Borneo islands from the Sulu archipelago. It is a safe and deep channel, 17 miles wide between Sibutu and Simonor islands, the shore on either side being steep-to.

Tides and tidal streams.—When navigating this passage, great attention must be paid to the tides, which run with a velocity of 2 to 4 knots. The times of high water at Sibutu island, Dent haven, Port Bongao, Pearl bank, Dok kan, and Kagayan Sulu are from 6h. to 6h. 50m., and the streams run for 3 hours after high and low water, but it must be borne in mind that the times of high water at Tambisan, and on the Borneo coast to the northward, are from 10h. 52m. to 12h., and that the streams are weaker than in the offing.

It is high water, full and change, at Sibutu at 6h. 50m.; springs rise 5 feet.

The officers of *H.M.S. Nassau* remarked during the survey in 1872 that the tidal streams in the main channel were very steady in direction; the flood stream setting N.W. and ebb to South, but there was uncertainty as to duration, the streams occasionally running as much as 10 hours at a time, probably influenced by the winds and also by changes in the moon's declination, as with the tides on the south coast of Mindanao. See page 20.

In the channel west of Sibutu island the officers of *H.M.S. Egeria*. in 1892 observed the flood stream to set to the south, and the ebb to the north, with a velocity of from 3 to 4 knots an hour, and the streams to turn with high and low water by the shore.

SIBUTU ISLANDS AND REEFS (*Lat. 4° 45' N., Long. 119° 23' E.*) lie directly on the route between Dent haven and Sibuko bay; the channel between their northern limits and the southern shore of Tanjong Labian, 16 miles in width, forms the main approach to Darvel bay from the northward and eastward.

General charts 2576, 943, 2660b, 1263.

Chart 928, Sulu archipelago. Var. 1° 50' E.

Navigation amongst these reefs is rendered easy by the help of the islets, which are readily distinguished, and are conveniently situated for fixing a ship's position.

Channels.—The channel on the western side of Meridian and Frances reefs, and eastward of Blake reef, Payne rock, and James patch, is convenient as affording anchorage in every part; the only narrow part of it is when passing Maranas islet, which may be passed on either side, and no special directions are necessary.

Chart 2576, Sulu archipelago, &c.

The channel, westward of the line joining Blake reef and Payne rock and eastward of Riddells reef, is $2\frac{3}{4}$ miles wide at its narrowest part between Blake reef and Siluag islet; it is perhaps the most convenient to use generally, being more direct than those further to the eastward, whilst the tidal streams do not attain the same strength as in the channels to the westward.

The channel, west of Siluag islet and Riddells reef, and east of Bajapa reef, is 8 miles long with a minimum breadth of $1\frac{1}{2}$ miles. The tidal streams run here with great strength, and they should be well considered before using this route.

The channel between Bajapa reef and Alice reef is about 6 miles long, and $1\frac{1}{2}$ miles wide between the steep edges of the reefs on either side. The tidal streams run straight through the channel with considerable strength. The last three channels are too deep for anchorage.

Along the southern edge of the bank on which these reefs stand, a rim of lesser depths runs close within and parallel to the 100-fathoms contour line, but no depths less than 17 to 20 fathoms have been found on this rim; the edge falls steeply to great depths and is clearly marked by tide rips and overfalls, which give the appearance at times of shoal water.

Chart 928, Sulu archipelago.

SIBUTU ISLAND (*Lat. 4° 50' N., Long. 119° 30' E.*) runs nearly north and south, and is 16 miles in length with a breadth of $2\frac{1}{2}$ miles in the middle, narrowing slightly towards the extremities. The eastern coast is slightly convex, and the western coast concave. With the exception of Sibutu peak, a conical hill, 500 feet high, on the east coast in the position given, the island is flat, and densely wooded with trees whose tops are elevated about 100 feet above the sea.

The coastline is mostly a low cliff of upraised coral, broken here and there by a sandy beach. A narrow reef fringes the coast on both sides and to the northward, but from the south point the reef extends southward for $4\frac{1}{2}$ miles with a breadth of $2\frac{1}{2}$ miles, enclosing a shallow

General charts 2576, 943, 2660b, 1293.

Chart 928, Sulu archipelago. Var. 1° 50' E.

lagoon 6 miles in length, lying close to the south-east coast, but with no apparent entrance.

The reef dries in patches at low water, and near the southern end there is a sandbank with a wooded islet on it, the trees upon which reach a height of 120 feet; there are also two other small islets on the sandbank.

The fringing reef is steep to around, and there is no anchorage. On the western shore at $4\frac{1}{2}$ miles from the northern point there is a village with a small wooden pier.

Sibutu island belongs to the United States; ceded by Spain by treaty, 1898.

Omapui, Sipankot, and Tumindao are a chain of low flat-topped wooded islets, on a reef 27 miles in length and 8 miles wide, lying 2 to 3 miles west of Sibutu island and parallel to it. Tumindao, the largest of these islets, is 7 miles long, north and south, with a maximum breadth of $1\frac{1}{2}$ miles, and like the other islets is wooded and of uniform height, the tops of the trees being from 130 to 190 feet high. A chain of small wooded islets and rocks stretches for $3\frac{1}{2}$ miles south of Tumindao. Sitanki, the first islet southward of Tumindao, is very small, but is of some importance, as most of the trade between Borneo and the Bongao district centres there; it is inaccessible except by small boats at high water.

Though it is stated that there are few permanent inhabitants on any of these islands, they are much frequented by fishermen from Simonor and Borneo for trepang, which is found in great profusion on the reefs to the westward. The natives report that wild cattle are very numerous in Sibutu, and that Omapui abounds with wild pigs.

From the north-east point of Omapui, the northernmost of these islets, the reef trends north-westward for 2 miles, and then south-westward for a distance of 4 miles to the entrance of a large lagoon which extends 10 miles in a north-north-east and opposite direction, and affords access to the western shore of Tumindao, where there is a village. This lagoon has not been examined in detail, but it appears to be fairly clear of coral patches and to have a general depth of 7 to 10 fathoms. The entrance, which appears to have a depth of 5 fathoms, is considerably narrowed by obstructions, but in case of necessity a vessel could doubtless enter the lagoon with a favourable light, and a boat ahead.

From the lagoon entrance (*Lat. $4^{\circ} 52' N.$, Long. $119^{\circ} 19' E.$*) the western edge of the reef trends southward for 23 miles, with no break in its continuity except two narrow channels into a lagoon near the south end of the reef; this southern lagoon has depths of 8 to 11 fathoms, and a narrow opening to the eastward in which the depth is 4 fathoms. The lagoon is divided into two basins joined by a narrow

General charts 2576, 943, 2660b, 1263.

Chart 928, Sulu archipelago. Var. 1° 50' E.

10-fathoms channel; the eastern basin affords good anchorage. The western channel has a depth of 6 fathoms, and is $2\frac{1}{2}$ cables wide; the south-western channel is shoal.

The edge of the reef is everywhere very steep except off the north-west point near the lagoon entrance, where the 10-fathoms line is distant nearly three-quarters of a mile.

The channel between Sibutu to the eastward and Omapui, Sipankot, and Tumindao is from $1\frac{1}{2}$ to 2 miles wide, but the tidal streams run from 2 to 4 knots at springs, flood to the southward and ebb to the northward. *See also* page 180.

Andulinang islet (*Lat. 4° 46' N., Long. 119° 15' E.*), lying $11\frac{1}{2}$ miles S.W. $\frac{1}{2}$ W. from the north-west point of Omapui, is small and wooded, with a conspicuous tree on its summit 110 feet high, and a rock about 30 feet high close to and immediately to the north of it.

The islet is situated close to the western edge and nearly 3 miles from the south end of a pear-shaped reef 6 miles in length north and south and $1\frac{1}{2}$ miles wide for the southern half, tapering to half a mile in width at the northern end. The reef dries in patches at low water, and has on it near the northern end two sand cays drying 3 feet.

Purdie patches are a series of small detached sand and coral shoals, with 7 to 9 fathoms water over them, lying off the north end of the above reef and $3\frac{1}{2}$ to $5\frac{1}{2}$ miles N. by E. from Andulinang islet.

Chambers knoll, situated $3\frac{8}{10}$ miles north-west from Andulinang islet, is a small detached coral knoll with 9 fathoms water on it.

Maranas islet, lying $2\frac{3}{4}$ miles S. by W. from Andulinang islet, is small and wooded, the tops of the trees being 85 feet above the sea. It stands on a reef that projects about half a mile from the islet; the edges of the reef are steep, and there is a clear channel half a mile wide between it and Andulinang islet reef.

Meridian reef, separated from the southern end of Andulinang reef by a channel half a mile wide and 7 fathoms deep, stretches southward for 12 miles with an average width of one mile. A sand cay that dries 4 feet at low water lies near its southern end.

The western side of this reef runs off shoal for upwards of half a mile from the edge for the greater part of its length, and then drops down into 10 fathoms.

Chart 2576, Sulu archipelago, &c.

Middle reef, lying half a mile southward of Meridian reef, is $2\frac{1}{2}$ miles in length, north and south; a sand cay lies near its northern extremity. The channel between Meridian and Middle reefs has a depth of 13 fathoms in the centre, but is too much narrowed by the shoal water running off the reefs on either side to admit of a ship using it with safety, as the tides run through it with great strength.

Anchorage.—A ledge of 8 to 12 fathoms extends three-quarters
General charts 2576, 943, 2660b, 1263.

Chart 2576, Sulu archipelago, &c. Var. 1° 50' E.

of a mile from the eastern side of Middle reef, falling steeply into deep water; the tides run strongly here, but it nevertheless affords an anchorage.

Frances reef, immediately to the southward of Middle reef, is the southernmost of the chain of reefs extending from Andulinang islet; it is $4\frac{1}{2}$ miles in length, N.E. by N. and S.W. by S.

The eastern side of Frances reef is quite steep; the western side, on which there is a long sand cay dry at low water, shoals gradually. The channel between Middle and Frances reefs has 6 to 7 fathoms in it, but it is narrow and the edges of the reefs are ill-defined; moreover, it has not been closely examined.

Chart 928, Sulu archipelago.

Blake reef, westward of Maranas islet, is $2\frac{3}{4}$ miles in length, north and south, by one mile in width; the channel between Blake and Maranas reefs is two-thirds of a mile wide.

Bulu Bulu islet (*Lat. $4^{\circ} 40' N.$, Long. $119^{\circ} 13' E.$*), situated $3\frac{1}{4}$ miles south-south-westward from Maranas islet, is small and wooded, showing a well-defined summit over the centre, 105 feet high to the top of the trees. The islet is surrounded by a reef to a distance of about 2 cables; a small coral patch of 7 fathoms lies three-quarters of a mile north-west from it.

Payne rock, awash at low water, is nearly in the centre of a narrow shoal of sand and coral, three-quarters of a mile in length north and south, with depths of 3 to 5 fathoms over it, and lies $6\frac{1}{4}$ miles South from Bulu Bulu islet.

Chart 2576, Sulu archipelago, &c.

James patch is a small coral patch with 7 fathoms on it and deep water around, lying 3 miles southward of Payne rock; there is an 8-fathoms patch one mile north-westward of it.

Siluag islet, one-third of a mile in length, lying $6\frac{1}{4}$ miles S.W. by W. $\frac{1}{4}$ W. from Andulinang islet, is wooded and flat topped, the tops of the trees being 85 feet high. A sand cay that dries 3 feet stands on the narrow fringing reef close to and immediately north of the islet.

Riddells reef, the north end of which lies $4\frac{1}{2}$ miles South of Siluag islet, is a narrow coral reef $2\frac{3}{4}$ miles in length north and south, with two sand cays that dry at low water near its southern end.

Nearly midway and exactly in the line between Siluag islet and Riddells reef there are two coral shoals; the northern of these has 5 fathoms on it at 2 miles south of Siluag islet, the other, a mile further south, or $1\frac{1}{2}$ miles from Riddells reef, has a depth of $3\frac{1}{2}$ fathoms.

General charts 2576, 943, 2660b, 1263.

Charts 1680, 2576.

Bajapa reef, the north-eastern end of which lies 2 miles W.N.W. from Siluag islet, is $8\frac{3}{4}$ miles in length in a north-north-east and south-south-west direction, and $1\frac{1}{2}$ miles wide in the middle; it dries in patches at low water and encloses a lagoon in the centre, the entrance to which is on the south-west side. This reef is steep-to except at the north end, where shoal water extends for a short distance.

Alice reef, to the north-westward of Bajapa reef, is $5\frac{3}{4}$ miles in length north-north-east and south-south-west, with a width of about $1\frac{1}{2}$ miles in the middle; it is steep-to around, except off the north-east point, from which the 5-fathoms line lies at a distance of over half a mile.

Chart 1680, Darvel bay.

Pangan islet (*Lat. $4^{\circ} 42' N.$, Long. $119^{\circ} 2' E.$*) is a small wooded islet, 75 feet high, standing on the southern side of a narrow steep reef which projects one-third of a mile to the northward of the islet. It lies about one mile westward of the south part of Alice reef.

Charts 1680, 1681.

Alice channel is the deep channel between Pangan islet and Bajapa reef to the north-east, and Matakings islets and reef to the south-west; it is over 6 miles in width at the narrowest part between the south point of Bajapa reef and Matakings islet.

Bank.—A bank of coral and sand is situated on the eastern side of Alice channel with Boheian island bearing S. 71° W., distant $8\frac{1}{2}$ miles. It is about 2 cables long north and south and $1\frac{1}{2}$ cables broad within the 10-fathoms contour, and has a least depth of $6\frac{1}{4}$ fathoms at its northern end. At about one cable south-south-westward is another bank about $1\frac{1}{2}$ cables in length, with $8\frac{1}{2}$ fathoms on it and from 12 to 18 fathoms between them.

The islands to the westward of Alice channel will be described after Darvel bay.

Tides and tidal streams.—It is high water in Alice channel, at full and change, at 6h. 20m. The tidal streams run strongly, especially in the vicinity of Pangan islet and Bajapa reef, flood to the southward and westward, and ebb to the northward and eastward, with a velocity of 2 to $2\frac{1}{2}$ knots.

It is high water, full and change, at Sibutu island at 6h. 50m.; springs rise 5 feet.

In the channel west of Sibutu island, and also in the channel east of Meridian reef, the streams run from 2 to 4 knots. The streams change approximately at high and low water by the shore.

General charts 2576, 2660b, 1263.

Charts 1680, 1681. Var. 1° 50' E.

On the edge of the bank south-west of Frances reef there are strong tide rips and overfalls; the flood stream runs here with exceptional strength, frequently as much as 3 knots, and sets to the southward and south-eastward over the edge of the bank.

Chart 1680, Darvel bay.

DARVEL BAY, on the south side of Unsang peninsula, penetrates about 65 miles to the westward from Tanjong Labian. The north shore of the bay is clear of outlying reefs, except Howard shoal, but the west and south shores have numerous islands and coral reefs off them; a detailed description of these will follow. Numerous rivers discharge into the bay, but very few are navigable for boats beyond a short distance from their mouths.

The hills on the north side are densely wooded, and for the most part low and undulating, of uniform outline, presenting few definite features, and culminate in the Bagahak range midway along the coast. The south coast is also everywhere thickly wooded, with mountainous ranges standing some little distance back from the coast, but these are generally more remarkable in shape and more easily recognisable than those on the north shore. Most conspicuous among them may be mentioned Mounts Madai and Sinalong, and on a clear day Mount Silam, at the head of the bay, overtops all others in the vicinity.

Of the islands in the bay, Timbu Mata island, separated from the mainland by only a narrow channel, is much the largest, and its sharp summit is an excellent landmark. Pulo Gaia, just within the entrance to the bay, stands well out from the land, and is of so remarkable a shape from most points of view that it is quite unmistakable. Views A and B, on chart 1680.

On the coasts of the bay there are but few inhabitants. A few villages are seen on the north shore, but none on the mainland on the south side. The only islands that are inhabited are Larapan, Tatagan, Bum Bum, Omadal, and Danawan. These natives are descendants of the pirates that formerly infested these waters; they cultivate very little land, and subsist principally on fish. The languages spoken among them are Malay and Sulu. The Company appoints a native chief and pays him a regular salary; through him dealings with the natives are carried on. The chief at present resides on Tatagan island (*Lat. 4° 36' N., Long. 118° 44' E.*).

The British North Borneo Company have settlements at Lahat Datu on the north coast and at Simporna in the Tando Bulong channel on the south side. The Government Resident resides at Lahat Datu, and a detachment of constabulary is stationed there.

General charts 1868, 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Winds and weather.—The following remarks are by the officers of H.M.S. *Egeria* during the survey in 1891 and 1892:—

March was a very dry month with light winds, principally from north-west to north-east, and a considerable proportion of calms.

April in 1891 was also a very dry month, but in 1892 it was exceptionally wet, rain falling nearly every day, and several thunderstorms were experienced. The winds in both years were light, principally from north-west, with an increasing proportion from between north-east and south-east, the easterly winds usually setting in during the forenoon or afternoon, but always quite light. The temperature of the sea was distinctly higher this month than at any other time in 1891.

In May the winds blew very fairly from all quarters, but with a preponderance from between the north and north-west and also from between north-east and south; westerly winds beginning to be noticeable. The thermometer stood higher than in March and April, but with a cloudy sky the heat was not so oppressive. In 1891 more rain was experienced in May than in the previous month.

In June, easterly, southerly, and south-westerly winds prevailed, but were light; there was a decided increase in the amount of rain.

In July south-westerly and north-westerly winds increased markedly both in frequency and force, with an occasional squall from the north, force 5, accompanied by heavy rain lasting for about an hour. Rainfall about the same as last month.

In August the winds were light, principally from north-west, but with a considerable proportion from south and south-east; an afternoon squall of wind and rain from the south or south-west, force 3 to 5, was a frequent occurrence. Rainfall diminishing; temperature also showing a slight decrease.

The barometer during the whole period from March to August varied but little, never rising above 30·06 or falling below 29·84.

Tidal streams.—The general set of the flood stream is to the southward and westward, and of the ebb to the northward and eastward, these directions being modified by the trend of the land and reefs in particular localities.

Along the northern shore of Darvel bay the flood stream sets westward and the ebb eastward, about one knot per hour at springs. Along the southern shore of the bay the flood stream runs to the westward, and the ebb eastward and north-eastward, the direction being modified by the land; the strength is not very great.

The tidal streams appear to turn approximately at the times of high and low water by the shore.

General charts 1868, 2576, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 50' E.

COAST.—Tanjong Labian (*Lat. 5° 8' N., Long. 119° 13' E.*), the north-east point of Darvel bay, is low and difficult to locate precisely from seaward. From this point the sandy beach trends S.W. by W. for 4 miles to a rounded point conspicuous by the high *casuarina* trees immediately behind it; from thence it takes a west-south-westerly direction for $7\frac{1}{2}$ miles to another rounded point also remarkable for its high trees, and close to the westward of which is the entrance to the Teloh Sibet, a small river the mouth of which dries across at low water and is marked by nipa palms. At about one mile westward of the river entrance is a red cliff, 80 feet high.

Chart 1680, Darvel bay.

Between this last point and Tunku point, $11\frac{1}{2}$ miles further westward, the coast forms a slight indentation, at the head of which is the village of Tolibas and another scattered village; Tolibas village is at the mouth of a small stream, the entrance to which for boats is marked by stakes.

Chart 1868, Taganak to Tawi Tawi.

Aspect.—Between Tanjong Labian and Tunku point the land rises gradually from the low sandy coast to a wooded ridge 400 to 500 feet in height at a distance of about $1\frac{1}{2}$ miles from the coast. There is nothing remarkable in this ridge, and a uniformly flat densely wooded country forms the eastern portion of Tanjong Unsang peninsula. At 3 miles behind Dent haven there appears to be a range of wooded hills 400 to 500 feet in height which show on the sky line, but the only hill that can be identified is a wooded summit 500 feet high, $3\frac{1}{4}$ miles south-westward of Dent haven.

Chart 1680, Darvel bay.

Mount Bagahak, 2,740 feet in height, situated 7 miles west-north-west from Tunku point, is the summit of the mountainous range on the north shore of Darvel bay. It falls steeply to the northward and eastward, and is prominent as a distinct peak from those directions, but is frequently obscured by clouds. Mount Bagahak slopes very gradually to the southward and westward, and thence shows as a smooth-topped range with no prominent features on it.

Chart 1868, Taganak to Tawi Tawi.

Falling to the northward to quite a low watershed, the ridge rises again to a rounded apex 1,740 feet in height, at $5\frac{1}{2}$ miles north-north-east from Mount Bagahak, and continuing for 6 miles north-eastward it then gradually diminishes in altitude, terminating in End hill, 1,400 feet high, from which it slopes gradually down, and loses itself finally in the flat wooded country behind Tanjong Labian.

General charts 1868, 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Tunku point (Lat. $5^{\circ} 0' N.$, Long. $118^{\circ} 52' E.$) is low and rounded, and lies N. by E. $\frac{1}{2}$ E., distant 24 miles from the summit of Pulo Gaia. Westward of the point the land rises to the Bagahak range, the spurs from which run down in steep slopes to the coast. Northward of Tunku point there is a well-defined ridge of undulating hills from 400 to 575 feet high, standing from one to 2 miles back from the coast. Tunku river, which has its rise 12 miles northward of Tunku point, flows through a gap in these hills and enters the bay close to the westward of the point. The entrance has only one to 2 feet water on the bar at low water. A village stands on the eastern bank of the river about three-quarters of a mile within the entrance.

Caution.—A mud flat that dries projects nearly half a mile from Tunku point, and shoal water extends a quarter of a mile further, dropping very suddenly down into 14 fathoms. The edge of the shoal does not always show clearly on account of the general discoloration of the water by the Tunku river; as the marks for fixing the position are distant, Tunku point should not be rounded closely, and vessels should keep outside the 20-fathoms contour line when passing it.

The 10-fathoms line lies at a distance of $1\frac{1}{2}$ miles from the coast off the casuarina point 4 miles west-south-west of Tanjong Labian, from whence it gradually approaches the coast to half that distance off the villages. From the regularity of the soundings the indications of the lead serve as a reliable guide in navigating this coast at night, or in thick weather, but care should be taken not to shoal the water under 10 fathoms westward of Tanjong Labian, nor under 20 fathoms to the north-eastward of it.

Bagahak point, about 13 miles westward of Tunku point, is itself a low mangrove point, but a spur of the Bagahak range, 520 feet high, runs down in a southerly direction to within a short distance of it. This spur is a prominent feature when seen from eastward or westward, and a summit on it, 950 feet high, about one mile inland, forms a landmark easily identified from those directions, but not from the southward, as it is backed by the higher land. See View B, on chart 1680.

For a distance of 4 miles to the eastward and 2 miles to the westward of Bagahak point the coast is fringed by coral reefs about three-quarters of a mile in width, in which there are three narrow channels leading to the shore with depths of from 5 to 10 fathoms. The edges of these reefs are steep-to.

Howard shoal, lying 2 miles south of Bagahak point, is the only outlying danger off the north-eastern coast of Darvel bay. It

General charts 1868, 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

is a narrow coral shoal, with a least depth of $2\frac{1}{4}$ fathoms, 3 cables in length in an east-south-east and opposite direction within the 5-fathoms limit, rising abruptly from depths of over 20 fathoms.

Turner patch is a small coral shoal with 9 fathoms (and possibly less) on it, standing on the edge of the 20-fathoms contour line at the distance of $1\frac{1}{4}$ miles from the coast, and $4\frac{4}{10}$ miles E. $\frac{3}{4}$ N. from Shoal point.

Kennedy bay (*Lat. $4^{\circ} 57' N.$, Long. $118^{\circ} 33' E.$*) has not been minutely examined, but it appears to afford good anchorage in 10 fathoms, mud, at the distance of two-thirds of a mile from its head. A horn of reef projects nearly half a mile southward from the north-eastern point of the bay, and a shallow broad flat extends $1\frac{3}{4}$ miles south-eastward from the western side.

Kennedy bay may be entered by bringing the summit of the south-westernmost coast hill, 335 feet high, to bear N.W. $\frac{3}{4}$ W., which bearing will also lead half a mile south-westward of Turner patch; anchorage in a depth of 10 fathoms may be had when Shoal point bears S.W. $\frac{3}{4}$ W., with the western extreme of Tabauwan island just open to the southward of it.

DARVEL PENINSULA, the southern face of which is 3 miles long, east and west, is low and flat, fronted by mud flats, and covered by trees, their tops being from 100 to 120 feet high. Deep mangrove creeks intersect the peninsula; none of these, however, were found actually to connect with the Silibukan river.

Shoal point is the south-eastern extremity of Darvel peninsula: shallow water extends $2\frac{1}{2}$ miles eastward from the point, forming the shallow flat in Kennedy bay already mentioned, and also southward of the peninsula to a distance of nearly one mile. The depth decreases very suddenly from 10 to 3 fathoms south-eastward of the point, and vessels passing should keep a good offing as the lead gives but little warning. Tanjong Malandong is the south-west point of the Darvel peninsula.

Beacon.—Armstrong reef, a small coral reef, drying 5 feet at low water, with depths of 6 to 7 fathoms around it, lies $2\frac{1}{4}$ miles W. by N. $\frac{1}{4}$ N. from Tanjong Malandong. A wooden beacon with white triangle topmark marks its western extreme.

Clearing mark.—The summit of Adal island in line with the south-western peak of Mount Sidongal, bearing S. 28° E., leads 6 cables westward of Armstrong reef and half a mile westward of the edge of the shoal spit off the entrance to Segannen river.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Segannen and Silibukan rivers converge at $1\frac{1}{4}$ miles within their common entrance on the north-west side of Darvel peninsula. This entrance is nearly half a mile wide at the mouth, and may be recognised by a clump of trees 130 feet high on the northern point, somewhat higher than the dead level of the trees in the immediate neighbourhood.

A shoal spit extends $1\frac{1}{2}$ miles westward from the entrance to these rivers. The deepest water over the bar is 4 feet at low water springs, with the northern summit of Mount Silam in line with the summit of Sakar island, bearing West. On passing the fishing stakes and steering for the northern entrance point the water deepens to 8 and 10 feet at one cable southward of that point. Mud flats stretch off the southern entrance point, which should therefore be avoided.

The northern and western edges of the above-mentioned spit are very steep, falling down abruptly from 3 feet to 11 fathoms; the lead therefore on passing it is but little guide, and strict attention should therefore be paid to the clearing mark given above.

Segannen, the northern river, was explored by the boats of the *Egeria* as far as the Segannen tobacco estate, about 3 miles up the river, where there is a jetty for landing and a road leading from it to the estate.

Silibukan, the southern river, was also examined as far as the tobacco estate lately opened at Telok Bukan (*Lat. 4° 59' N., Long. 118° 31' E.*), 4 miles from the junction of the rivers. At the estate the river is about 20 yards in width, with a depth of 6 feet, but the level varies with the seasons. A small steam vessel from Sandakan visits these estates fortnightly.

Topography.—Westward of the Bagahak range there is a considerable area of apparently flat country drained by the Silibukan river. At $8\frac{1}{2}$ miles northward of Darvel peninsula a ridge running north and south rises to a summit 995 feet high which is readily distinguished. Westward of this ridge and separated from it by a valley, the land gradually rises from the coast to a perfectly flat-topped densely-wooded ridge about 600 feet in height, and lying 3 miles from the coast; the top of this ridge forms the sky line as viewed from the sea.

Coast.—From the entrance of the above rivers the coast curves round in a northerly and westerly direction to the settlement of Lahat Datu, 8 miles distant. Detached reefs and foul ground extend off the greater portion of this coast, to a distance of nearly a mile from the shore. From Lahat Datu a mangrove coast trends to the southward for 3 miles to the boat passage between Sakar island and the mainland.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Sakar island is only separated from the mainland to the westward by a narrow channel, and is not recognisable as an island. It is 5 miles long east-north-east and west-south-west, with an extreme breadth of 2 miles, densely wooded, and rises near the centre in a conspicuous knob to a height of 735 feet, visible over Darvel peninsula. The southern shore is straight, but the north coast is deeply indented, narrowing the island in two places to a width of half a mile, and there are some small islets close to the shore on that side.

The north-eastern extreme of Sakar island runs down to a low mangrove point (*Lat. 4° 59' N., Long. 118° 23' E.*) from which a reef projects eastward for three-quarters of a mile. Three wooden beacons with white diamond topmarks are placed on the eastern edge of the reef to mark it, but they are liable to be washed away. The edge is not always easily distinguished, and it should be rounded with caution.

Sakar island forms the southern side of a bay, at the head of which are the settlement and anchorage of Lahat Datu; the reefs in the approach to that place will now be described.

Clearing mark.—The summit of Adal island in line with the south-western peak of Mount Sidongal bearing, S. 28° E., just clears the edge of the reef off the north-eastern extreme of Sakar island, and Adal island must be brought to the westward of this peak before rounding the reef. Both Adal island and the south-west peak of Mount Sidongal show as sharp well-defined summits.

Dangers.—Beacons.—Voorwyk reefs are a chain of four small reefs extending from half a mile to 1½ miles in a S.E. ¾ E. direction from the pier at Lahat Datu. They dry 2 feet at low water and are fairly steep-to, with a depth of 7 fathoms close to, but shoal water extends for a short distance to the southward of the south-easternmost reef.

The northern reef is marked by a beacon on the east and west extremes; the largest reef has three beacons on it, at the eastern, southern, and western points, the two latter being red. The southern reef has a beacon with white diamond topmark on its east and west extremes.

A circular coral patch, about 30 yards in diameter, with 4 feet over it and a depth of 6 fathoms close around, lies midway between the north-west Voorwyk reef and the shore to the northward of it.

A beacon marks the edge of the shore reef two-thirds of a mile eastward of the pierhead.

Gray reef is a small coral reef 4 cables south of the pier, with a depth of 3 to 3½ fathoms close to its eastern edge. Another small reef lies one-third of a mile to the southward of it.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Both of these reefs are marked by white beacons on their eastern edges.

Halloran reef (*Lat. 5° 0' N., Long. 118° 22' E.*), lying 4 cables off the centre of the north coast of Sakar island, and 1½ miles west-north-west from the north-east point of that island, is a small coral reef drying 5 feet at low water; shoal water extends for a short distance off its north-east side, and is marked by a wooden beacon with white diamond topmark.

Clearing mark.—The western extreme of Darvel peninsula, just touching the eastern extreme of Sakar island, S. 58° E., leads a quarter of a mile north-east of Halloran reef.

The Beacons in Lahat Datu consist of tripods surmounted by large wooden topmarks, which are, when situated on detached dangers on the eastern side of the channel, painted red, and on the western side of the channel white. They are liable to be washed away.

Anchorage.—The anchorage at Lahat Datu is between Gray reef and the northernmost Voorwyk reef, in a depth of 5 fathoms, mud, with the pierhead bearing N. 35° W., and a remarkable conical hill 580 feet high on the western shore of the bay bearing W. by S. ½ S.

Directions for Lahat Datu.—From a position not less than 1½ miles southward of Darvel peninsula, a vessel should steer to the westward until the summit of Adal island comes in line with the south-west peak of Mount Sidongal, bearing S. 28° E., then keep that mark on astern until Mount Silam is in line with the summit of Sakar island, when haul to the northward and bring the eastern extreme of Adal island in line with the south-west peak of Mount Sidongal, in order to clear the reef projecting from Sakar island.

Having passed that reef, haul north-westward, and when the remarkable conical hill on the west side of the bay bears West, steer for it until the south-west extreme of Darvel peninsula touches the east end of Sakar island; then steer W.N.W. until the pierhead bears N. 35° W., and the pierhead steered for on that bearing will lead up to the anchorage between Voorwyk and Gray reefs, in a depth of 5 fathoms, mud.

Boat channel.—The channel westward of Sakar island is less than one cable wide in places, with a depth of 3 to 4 feet at low water. Steam launches can use this channel at high water, but a rock nearly awash at low tide lies on the eastern side, three-quarters of a mile within the southern entrance, and about half a cable westward of the south-west point of an islet at a turning point in the channel.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

LAHAT DATU (*Lat. 5° 2' N., Long. 118° 20' E.*), named officially Lahad Datu in British North Borneo, is situated in the north-western portion of the bay formed by the coast north of Sakar island, and is a small settlement forming the head-quarters of the Resident of the district and also of the Darvel bay tobacco company. The estate of that company occupies the flat country at the back of the settlement, and a road leads northward from it to the Segama river estate about 10 miles distant, but in wet weather the road is almost impassable.

The zinc-roofed houses at Lahat Datu are visible on approaching from the direction of Darvel peninsula as soon as they open out clear of Sakar island. A wooden pier with native houses on it projects to a short distance from the shore.

A pier 440 yards in length and 70 yards in breadth at the end, extends in a south-east direction from the south-west corner of the settlement into a depth of 3 fathoms. The steamers that call at intervals go alongside.

Communications.—A North German Lloyd steamer calls every month from Singapore *via* Sandakan.

The British North Borneo Company's launches also maintain frequent communication with Sandakan and also with Sibuko bay.

Lahat Datu is connected by telegraph and telephone with Sandakan, but both are unreliable.

Supplies.—Water is supplied to the village by coolies, who have to carry it about a mile from the river. It must be boiled before using it. Vessels must obtain it from the river with their own appliances.

Vegetables and bread are plentiful, but beef is difficult to obtain. Beef, 7½d. per lb.; vegetables, 2¼d. per lb.; bread, 3½d. per lb.

Tidal stream.—The water at Lahat Datu is, generally speaking, stationary, but intermittently there is a very slight east-going stream.

Islets south of Sakar.—**Crook reef** lies off the middle of the south coast of Sakar island, one mile to the southward of the conspicuous knob. Some small islets lie half a mile off the south-west end of Sakar; the southernmost of these islets has a sharp nipple 125 feet high at its south-east end.

Plan 1593, Silam harbour.

SILAM HARBOUR, in the north-west part of Darvel bay, is 6½ miles across between Sakar island and Tanjong Batu.

A line of detached reefs extends from Sakar island in a S.W. by W. direction, terminating in Adams reef, about 4 miles from the islet 125 feet high off the south-west point of Sakar; this line of reefs

General charts 1680, 2576, 2660b, 1263.

Plan 1593, Silam harbour. Var. 1° 50' E.

obstructs the eastern approach to Silam. Pulo Kalung Kalungun (below), standing on one of these reefs about the middle of the chain, indicates the main entrance, which is immediately north of this islet. See Directions, page 198.

Pulo Babi, near the centre of the harbour, and the Saddle islands (page 197) nearly landlock the anchorage off the settlement.

In the north and north-west parts of the harbour there are several reefs, and foul ground extends to $3\frac{1}{2}$ cables from the shore.

North shore of Silam harbour.—From Sakar island the coast trends to the westward for 6 miles to Silam anchorage, with a few minor indentations.

Soai Soaiun bay, 2 miles east-north-east from Silam, is $2\frac{1}{2}$ cables wide at the entrance, and, curving round to the westward, branches into two arms at the head, which is shoal. In the outer part of the bay there is a depth of 7 to 8 fathoms, mud, but barely room for a vessel to swing.

The shore on the north-eastern side at the entrance may be approached within a cable's length, but from the islet forming the south-western entrance point foul ground and reefs extend east-south-eastward for 3 cables in the direction of the Woodhall reefs.

Mark hill (*Lat. 4° 59' N., Long. 118° 12' E.*) rises to a well-defined summit 1,530 feet high, at $1\frac{1}{2}$ miles N.W. by N. from Silam, to which it sends down a long spur. It is readily recognisable, being the first summit showing on the sky line north-east of Mount Silam.

Mount Silam is a flat-topped wooded mountain 2,920 feet in height, $2\frac{3}{4}$ miles westward of Silam. It is altogether the highest mountain within many miles, and stands up boldly, being separated by a deep valley from the other mountains to the westward and southward of it, and falling steeply to the north-east; the ridge rising again to Mark hill continues to the eastward as a coast range with a gradually diminishing altitude. View B, on chart 1680.

Tanjong Batu, the southern point of Silam harbour, is the eastern extremity of a low range of coast hills.

ISLETS and DANGERS.—Pulo Kalung Kalungun, a small islet with a round top, 145 feet high, lies $1\frac{1}{4}$ miles south-south-east from Pulo Babi. It stands on a reef which projects about three-quarters of a cable from the islet.

Misan Misan reef, lying 9 cables S. 66° E. from Pulo Babi, is the south-westernmost of a line of reefs extending from Sakar island; it is small, barely covered at low water, and occasionally difficult to

General charts 1680, 2576, 2660b, 1263.

Plan 1593, Silam harbour. Var. 1° 50' E.

distinguish. The passage between Misan Misan reef and Kalung Kalungun is 8 cables in width.

Clearing marks.—Mark hill in line with the left extremity of Pulo Babi, bearing N. 63° W., leads southward of Misan Misan reef. Also, Mark hill in line with the north-east extreme of Pulo Babi, bearing N. 66° W., leads northward of Misan Misan reef, and between it and the reefs to the north-east.

Pulo Babi (*Lat. 4° 57' N., Long. 118° 16' E.*), near the middle of Silam harbour, is half a mile long, west-north-west and east-south-east, thickly wooded, with a remarkable conical summit 410 feet high near its eastern end, and is easily recognisable on approaching the harbour. There is very little reef off its southern and south-eastern sides, but from its western point a tongue of reefs projects for 3½ cables in a north-westerly direction. White rocks near the end of this reef show their heads one foot above high water.

Woodhall reefs are two detached coral reefs, which lie about half a mile from the northern shore of Silam harbour, and three-quarters of a mile south-eastward of Soai Soaiun bay; they are together about half a mile in length, west-north-west and east-south-east, and 1½ cables in width, and dry one foot at low water.

A narrow detached reef, 1½ cables long, lies 2 cables north of the north-east point of Pulo Babi, and narrows the channel between it and the Woodhall reefs to a width of 3 cables.

Mark hill in line with Wise hill bearing N. 72° W. leads through the middle of the channel.

Gusong dilaut is a narrow reef 3 cables long, east and west, and awash at low water, lying 4 cables west of Kalung Kalungun, with a clear passage between them.

Clearing mark.—Kissing hill, 540 feet high and 3¼ miles east-north-east of Silam, in line with the east extreme of Pulo Babi, bearing N. 6° W., leads between Gusong dilaut and Kalung Kalungun reefs.

Wanderer reef, awash at low water, lying 8½ cables S.W. by W. from Kalung Kalungun, is 4 cables in length north-north-east and south-south-west, and 1½ cables wide.

Adams reef is a small reef lying 5½ cables west-south-westward from the south end of Wanderer reef, and 8½ cables S. ½ E. from Giffard islet. There is a small sandbank at its eastern extreme which dries 2 feet at low water, at which time the remaining part of the reef is awash.

Clearing mark.—Mark hill in line with the western extreme of Pulo Sumabun, bearing N. 32° W., or eastern extreme of Giffard

General charts 1680, 2576, 2660b, 1263.

Plan 1593, Silam harbour. Var. 1° 50' E.

islet, in line with the western extreme of Pulo Babi, N. 22° E., leads westward of Adams reef.

The Saddle islands are a chain of six wooded islands extending from half a mile to $2\frac{3}{4}$ miles in a S.E. by E. direction from Pulo Bayan, immediately south of Silam.

Pulo Sagai, the westernmost, about 2 cables in diameter, stands on a reef separated by a very narrow passage from the reef projecting from Pulo Sumabun, the next island; it is 195 feet high.

Pulo Sumabun, about 6 cables in length, north-west and south-east, and 2 cables wide, is 280 feet in height; it is connected with Nipa Nipa, the next island to the south-east, by a reef.

Pulo Tabauwan is 6 cables long, north and south, with a summit near its central part 305 feet in height, and a hill on its northern end 175 feet high.

Giffard islet, the easternmost of the chain, is connected with Pulo Tabauwan by a reef, on which stands another small islet; it is wedge-shaped, rising at the eastern end to a height of 120 feet. A reef extends one cable eastward from this islet.

Power spit, a coral ledge extending in a N.W. by N. direction for $3\frac{1}{2}$ cables from the north extreme of Pulo Tabauwan, slightly obstructs the main channel between the Saddle islands and Pulo Babi.

Pulo Saranga.—Close to the eastward of Tanjong Batu is Pulo Saranga, $4\frac{1}{2}$ cables long, north and south, consisting of two wooded hills joined by a narrow strip of mangroves. The island is fringed by reef which projects southward 2 cables from the south end. The passage between these isles and Tanjong Batu is barred by a reef.

A small detached reef lies $3\frac{1}{2}$ cables eastward of Pulo Saranga.

Anchorage (*Lat. 4° 57' N., Long. 118° 13' E.*).—The anchorage off Silam is on a very uneven bottom of sand and coral, and is encumbered by three small coral heads with 4 fathoms over them in the southern part of the anchorage, and a fourth coral head, Holmes rock, with 3 fathoms on it, lying $7\frac{1}{4}$ cables N.E. from the western extremity of Pulo Sagai, and $7\frac{1}{2}$ cables S. 53° E. from the end of the pier. A large ship should anchor outside these patches in a depth of 15 to 16 fathoms, but a moderate-sized vessel can anchor on the banks within them.

A good berth for a small vessel is with the north extreme of Pulo Babi touching the south point of the southern islet off Sakar island, S. 87° E., which is a convenient mark to keep on astern when nearing the anchorage; anchor in a depth of 10 fathoms, sand and coral, when the east extreme of the southern part of Pulo Saranga touches the

General charts 1680, 2576, 2660b, 1263.

Plan 1593, Silam harbour. Var. 1° 50' E.

west extreme of Pulo Sagai, bearing S. 17° W. This berth only just gives room to swing, and vessels cannot approach nearer to the pier.

The edge of the reef off Silam is very irregular and broken up into patches.

South-west of Silam and to the north of Tanjong Batu the coast forms a bight which affords sheltered anchorage in a depth of from 8 to 10 fathoms, mud, with Tanjong Batu bearing S.S.E. $\frac{1}{2}$ E., distant 5 cables.

Directions for Silam anchorage.—The anchorage off Silam may be approached by passing either north or south of the Saddle islands. The approach from the eastward passing north of the islands is quite clear after passing Kalung Kalungun, but Power spit, projecting from the north point of Pulo Tabauwan, must be avoided. The passage from the southward is 4 cables wide between Pulo Sagai, the westernmost Saddle island, and Pulo Bayan, immediately south of Silam, and is quite clear except for the fringing reef which extends about $1\frac{1}{2}$ cables from the mainland shore.

From the eastward.—After passing Darvel peninsula at a distance of not less than 2 miles, steer for Pulo Kalung Kalungun; pass north of this island at the distance of about one-third of a mile and steer N.W. by W. $\frac{1}{8}$ W. for Mark hill until the south extreme of the southernmost islet (125 feet) south-west of Sakar comes in line with the north extreme of Pulo Babi, bearing S. 87° E. Then approach Silam inner anchorage with this mark on astern, which will lead a full cable northward of Holmes rock, and also northward of the 4-fathoms patches previously mentioned.

From the southward.—From a position with the east extreme of Giffard islet touching the west extreme of Pulo Babi (which line leads eastward of Moorhen reef and westward of Adams reef), and with Mark hill seen over the west extreme of Pulo Sagai, bearing N. 23° W., steer for the latter, being careful not to open Mark hill westward of the islet; this course leads a quarter of a mile north-eastward of the small reef lying eastward of Pulo Saranga. When Pulo Babi begins to show between Nipa Nipa and Pulo Sumabun the course can be altered to round Pulo Sagai at the distance of from one to 2 cables, after which, bringing the west extreme of Pulo Sagai in line with the summit of the southern hill of Pulo Saranga, bearing S. 23° W., steer with this mark on astern up to the anchorage, passing between the two westernmost of the 4-fathoms patches, and anchoring as convenient, as above.

SILAM (Lat. $4^{\circ} 58' N.$, Long. $118^{\circ} 13' E.$).—The North Borneo Company had a small settlement here, which was abandoned some

General charts 1680, 2576, 2660b, 1263.

Plan 1593, Silam harbour. Var. 1° 50' E.

years since, and the Resident removed to Lahat Datu. There is a small village on the beach, and a wooden pier 200 yards long projects from the village over the shore reef, but it is now in a dilapidated condition; steam launches can lie off the end of the pier.

The channel leading to the pier is marked by wooden beacons on the edges of the reefs; the beacons on the north side carry small red flags, and those on the south side white flags, but the beacons are liable to be washed away. The channel can only be used by boats or steam launches; larger vessels must anchor outside.

An experimental garden has been planted about half a mile from the beach, in which Liberian coffee seems to grow well; also cardamoms and pepper. Timber is plentiful and good; cattle thrive well.

Position.—The observation spot is about 200 yards from the beach, in lat. $4^{\circ} 57' 40''$ N., long. $118^{\circ} 12' 40''$ E. It is marked by a stone with the position cut on it. The Residency flagstaff formerly stood here.

Supplies.—There are a few Chinese traders here. Fish, eggs, poultry, and a small quantity of bananas and yams can generally be obtained.

Tides and tidal streams.—It is high water, full and change, at Silam anchorage, at 6h. 0m.; springs rise $7\frac{1}{2}$ feet, neaps 4 feet. There is very little tidal stream, which appears to turn approximately at the times of high and low water by the shore.

Chart 1680, Darvel bay.

COAST.—From Tanjong Batu the coast trends south-westward for $3\frac{1}{2}$ miles to Hastings point, fronted by several small detached reefs extending to a distance of from $1\frac{3}{4}$ to $2\frac{1}{2}$ miles from the shore, within which distance it is not prudent to navigate. This distance corresponds approximately with the 20-fathoms contour line of soundings. Hastings point may be identified by a conspicuous little wooded knoll 260 feet high near its extremity. Some small detached reefs lie half a mile eastward of the point.

Lamak bay (*Lat. $4^{\circ} 52'$ N., Long. $118^{\circ} 9'$ E.*), between Hastings and Skertchley points, penetrates $1\frac{3}{4}$ miles to the westward and affords anchorage in from 5 to 8 fathoms, mud. The south and west sides of the bay are shoal, the 3-fathoms line being distant upwards of a mile from the shore, but the north-west corner is deeper. The rivers Divatu, Magul, Sibahong, and Ladong discharge their waters into this bay, the coastline of which is fronted by extensive mud flats. None of these rivers are sufficiently broad or deep to allow boats to ascend them for any considerable distance, and they cannot be entered at all except at high water.

General charts 1680, 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Skertchley point (*Lat. 4° 50' N., Long. 118° 10' E.*) is a low mangrove point lying $2\frac{1}{2}$ miles southward of Hastings point. A spit of sand and mud, which dries, extends in a north-easterly direction for three-quarters of a mile from the point, and must not be approached too closely, as it falls somewhat steeply, and the lead will give but little warning. The entrance to the Ting-kaiu river is immediately to the southward of the point; it is too shallow to admit boats.

Plan 1593, Silam harbour.

Kiddle reefs, lying $1\frac{1}{2}$ miles south-south-eastward from Tanjong Batu, are two small reefs with some foul ground just to the north of them. Mark hill open eastward of Pulo Saranga, N. by W. $\frac{1}{4}$ W., leads eastward of them.

Chart 1680, Darvel bay.

Moorhen reefs are four small reefs, the southernmost of which lies $2\frac{1}{4}$ miles east-south-eastward of Hastings point.

West Stewart peak seen over the summit of Hastings point, bearing N. 61° W., leads one-third of a mile to the south of Moorhen reefs; and the summit of Pulo Babi well open to the east of the eastern end of Giffard islet leads just eastward of them.

Coast.—Between Skertchley point and the mouth of the Sungi Madai, 7 miles to the south-south-east, the mangrove coast projects slightly in a rounded point, and there are two salt water creeks in this stretch. A ridge of coast hills 285 and 395 feet in height, running north-north-west from the north entrance point of Sungi Madai for 2 miles assists to identify the river mouth.

Mountains.—Mount Beeston, situated 9 miles westward from Mount Silam, is a wooded peak 2,830 feet in height, sending a long spur in a S.E. by E. direction for $9\frac{1}{2}$ miles down to the coast on the north side of Lamak bay. About half way along this spur there are the Stewart peaks, nearly three-quarters of a mile apart, the western being 1,610 feet, and the eastern 1,510 feet in height. From these peaks two ridges are thrown off; one trending for a long distance to the west-south-west and the other curving round to the southward forms an amphitheatre in which the Divatu river takes its rise.

Mount Skertchley is a broad flat-topped mountain 1,530 feet high, situated 8 miles S. by W. from Stewart peak and standing 6 miles back from the coast.

Mount Madai, lying $5\frac{1}{2}$ miles south-eastward from Mount Skertchley, and $4\frac{1}{2}$ miles from the coast, is 1,560 feet high, and quite the most remarkable mountain in Darvel bay. It is of limestone with bare

General charts 1680, 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

cliffs, which show white in places, but on the summit there are some low trees, and the slopes are densely wooded. From the eastward the mountain shows as a perfect cone; from the northward it appears as a sharp peak standing on shoulders of nearly equal height.

Mount Piton, near the eastern end of the Mount Madai ridge, is 690 feet high, and not remarkable from the sea, as it is backed by higher land; the interest in this hill is on account of the Bird's-nest caves situated immediately below it. These caves are reached by ascending the Sungi Madai as far as practicable, and then a path of about 3 miles leads to the caves.

Sungi Madai is important as leading to the Bird's-nest caves. A small mangrove islet lies three-quarters of a mile eastward of the entrance, at the end of a spit of sand and mud which dries at low water, and from the islet a broad tongue of reef projects three-quarters of a mile to the northward; the passage into the river lies between this projection and the shore reef. At the mouth of the river there is a depth of from 3 to 4 feet at low water, deepening to 2 and 3 fathoms within. The Sungi is navigable by boats for a distance of $1\frac{1}{2}$ miles.

Tagabua (*Lat. $4^{\circ} 46'$ N., Long. $118^{\circ} 14'$ E.*) is a small wooded islet 67 feet high, lying $2\frac{1}{2}$ miles N.N.E. $\frac{1}{2}$ E. from the entrance to Sungi Madai, and 6 miles S.E. $\frac{1}{4}$ E. from Skertchley point. It is bordered by foul ground and detached reefs on its west and south sides; to the westward the reefs extend to within 3 cables of the shore bank, and to the southward the foul ground extends to a distance of nearly one mile, which must be avoided by vessels visiting Sungi Madai. Anchorage may be had in 9 fathoms, mud, at $1\frac{1}{2}$ miles S.W. from the islet.

Coast.—From Sungi Madai the coast trends south-eastward for 7 miles to the entrance of Sigalong trusan (page 210). The coastline, which is everywhere of mangroves, is irregular; the shore reef is much broken up with various off-lying patches.

Mounts Mostyn, Wyatt, Cook, and Hewett are conspicuous and well-determined marks for ascertaining a ship's position in this locality; they are respectively 1,625, 410, 705, and 1,355 feet in height. Mount Mostyn can be seen from Sibuko bay.

Greep reefs are three detached reefs separated by deep water, which extend from about three-quarters of a mile to 2 miles from the shore near the foot of Mount Wyatt.

Merrett reefs are a line of reefs running north for $2\frac{1}{2}$ miles from the western entrance point of Sigalong trusan. A rocky patch with less than 6 feet water on it lies a quarter of a mile eastward of

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

these reefs, with the west extremity of Timbu Mata island bearing S.S.E. $\frac{1}{2}$ E., distant $1\frac{3}{4}$ miles.

Another patch with 3 fathoms on it, about one mile eastward of Merrett reefs, lies with the west extremity of Timbu Mata bearing S. by E. $\frac{1}{4}$ E., distant one mile.

Chart 1681, Northern shore of Sibuko bay.

Southern shore of bay.—**Bum Bum island**, presenting no prominent features, is a large triangular-shaped island, flat, and densely wooded, the tree tops being from 150 to 170 feet above the sea. Panto Panto point (*Lat. 4° 27' N., Long. 118° 46' E.*), the eastern extreme of the island, forms the point of separation between Darvel and Sibuko bays; the west side of the island is known as Kubong, and is separated from the eastern extremity of the mainland on the south side of Darvel bay by a narrow channel named Trusan Tando-Bulong (*see* page 215). The coastline is mostly comprised of low cliffs of upraised coral much broken up into small points and bays. On the north coast, which stretches 8 miles in a west-north-westerly direction from the east point, there is a good deal of mangrove, and there are several off-lying low islets on the fringing reef of sand and coral, which dries in patches. The reef extends about $1\frac{1}{2}$ miles from the shore, and south of Sabankat island it projects to the northward in a horn upwards of 2 miles from the coast, narrowing the passage there to a width of $1\frac{1}{2}$ miles.

There are several villages on the north coast, and two on the south-east side about one and $1\frac{1}{2}$ miles, respectively, from Panto Panto point, the eastern extreme of the island.

Sigalong river, falling into the south-eastern part of Sigalong trusan $3\frac{1}{2}$ miles south-westward of Langas island, flows nearly north and drains the country east of Mount Sinalong. It is broad and deep within the entrance, carrying 4 fathoms for some distance, but on the bar at the mouth the depth is only 3 or 4 feet at low water. The banks are lined with nipa palms, and the steam cutter of the *Egeria* ascended the river for 5 or 6 miles, finding it free from snags and other obstructions.

Chart 1680, Darvel bay.

Pyramid hill is a remarkable pyramidal-shaped hill, 1,050 feet in height, standing close to the coast about half way along the southern shore of Sigalong trusan. It is the northernmost peak of an isolated range of hills occupying the peninsula eastward of Sipit river.

Sipit river falls into the south side of Sigalong trusan just to the westward of Pyramid hill. The entrance is fronted by a broad

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

flat over which, for a distance of 2 miles, the depth is only about 2 feet at low water, deepening within to 3 and 4 fathoms; but although there are several arms in which there is deep water they are all so narrow at 2 to 3 miles from the entrance that nothing but a canoe can get further than that distance.

Chart 1681, Northern shore of Sibuko bay.

Mount Sinalong, situated about $7\frac{1}{2}$ miles southward from Pyramid hill, is one of the most conspicuous mountains on the south side of Sigalong trusan. It is 2,060 feet high, conical in shape, and falling steeply to the plain below on all sides is readily recognisable. See view A, on chart 1680.

Chart 1680, Darvel bay.

Sigalong trusan.—See page 210.

ISLANDS AND OFF-LYING REEFS IN DARVEL BAY.—Central part.—Fremantle shoal, the centre of which lies 8 miles N. by E. $\frac{1}{4}$ E. from the summit of Pulo Gaia, is about one mile in diameter, with depths of 8 to 10 fathoms over coral.

Richards reef, lying one mile west-south-west of Fremantle shoal, consists of a collection of reefs the outer edges of which are awash at low water; it encloses an area 2 miles in length, north-east and south-west, and $1\frac{1}{2}$ miles in width. On the north-west and north-east sides the edges of the reefs are not steep-to, and the 10-fathoms line projects nearly half a mile in the latter direction, but elsewhere the reef rises abruptly from depths of 40 fathoms and upwards.

From the south-west extremity of Richards reef the summit of Pulo Gaia bears S. by E., distant 6 miles.

Adal island (*Lat. $4^{\circ} 45' N.$, Long. $118^{\circ} 31' E.$*) is a conspicuous small conical wooded island 360 feet in height, situated 8 miles N.W. by N. from Tanjong Sidongal, the east point of Timbu Mata island. It is fringed by a narrow reef, and a sand spit covered at high water projects westward from its south point.

Bakuhang island, Bankauhang islet, and Gatahang islet stand on reefs which are nearly joined; Bakuhang, the easternmost and largest, is 285 feet in height, and lies $1\frac{1}{2}$ miles W. by N. from Adal island with a passage between them. Gatahang, the westernmost and smallest of the group, is 68 feet high with a solitary tree on the summit; a reef projects 4 cables westward of the islet. The passage between this group of islets and Tabauwan to the westward is $3\frac{1}{2}$ miles in width.

Tabauwan is the largest and easternmost of a group of thickly - wooded islands occupying the western part of Darvel bay. Being higher than the remainder of the group, and

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

standing well out from the land, it is easily recognisable when approaching from the eastward. It lies $8\frac{1}{2}$ miles south-westward of Darvel peninsula, is $3\frac{3}{4}$ miles in length in an east-south-east and opposite direction, is densely wooded, and rises about the middle to two peaks; the western peak, 905 feet in height, shows sharply from all directions; the eastern is 910 feet high. There is but little reef surrounding the island, except near the south-eastern end, where a tongue of reef stretches for over 2 cables to the southward.

Near the middle, on the southern side of Tabauwan, a bay, a quarter of a mile in width and three-quarters of a mile deep, is formed between two promontories jutting out to the S.S.W. from the slopes of the two peaks; this bay has depths of 13 to 20 fathoms in the centre, but at the head it is foul for nearly a quarter of a mile from the shore.

Silumpat island, lying 2 cables south of Tabauwan, is $1\frac{1}{2}$ miles in length, north-north-west and south-south-east, and 550 feet in height. It is nearly divided into two islands, the parts being only connected by a low narrow neck of land near the north end.

Bohihan island, lying 2 miles westward of Tabauwan, is triangular in shape, its southern side being about $1\frac{1}{2}$ miles in length; the summit, elevated 780 feet, is very rounded, and the island is densely wooded. A long narrow reef obstructs the passage between Bohihan and Pulo Tanna, situated three-quarters of a mile southward. Palundangan islet (*Lat. $4^{\circ} 47' N.$, Long. $118^{\circ} 19' E.$*), 330 feet high, lies south of Bohihan and 3 cables distant.

Majinkil and Bakuhang islets, south of Palundangan, are both small; the former has a well defined summit, 430 feet high. A small islet stands near the edge of a reef lying 3 cables west of Majinkil.

Maganting island is the westernmost of this group of islands, and lies rather more than a mile west-north-westward of Bohihan island and 5 miles from the shore at the head of Darvel bay. It is over a mile in length, east-south-east and west-north-west, narrow, and 385 feet high, with a hill at either end and a slight depression between. There is a small reef off the middle part of the southern side of Maganting island, distant about one-third of a mile from the shore.

Little reef is a small reef awash at low water situated 2 miles N. by W. $\frac{1}{2}$ W. from the west end of Maganting island.

Nichols reef is a small coral patch nearly awash at low water lying nearly $2\frac{1}{4}$ miles west-south-west from the west end of Maganting island.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Lawler reef lies 8 cables N.E. by E. $\frac{1}{4}$ E. from Tagabua islet.

Chart 1681, Northern shore of Sibuko bay.

Southern side of bay.—Boheian island (*Lat. 4° 28' N., Long. 118° 56' E.*), situated 19 miles westward from Frances reef on the eastern side of Alice channel, stands near the southern end of a reef which extends north and south through a length of 7 miles, with an extreme width near the middle of $1\frac{3}{4}$ miles, tapering to half a mile at the extremities; it forms the western side of the Alice channel (page 185). The reef itself is quite steep-to, falling down on all sides to depths of 40 and 50 fathoms within a cable's length. The islet, $6\frac{1}{2}$ cables in length, north-west and south-east, is narrow, flat-topped, and wooded, and 120 feet in height to the tops of the trees.

Charts 1680, 1681.

Near the north end of the long reef there is a small wooded islet, Timba Timba, 33 feet high, with a sandbank that dries 3 feet off its southern end.

Chart 1680, Darvel bay.

Pulo Kapale stands on a reef lying half a mile northward of the reef off Timba Timba and connected with it by shoal water. The islet is small, wooded, and 90 feet high; a sandbank, at the extremity of which there are a few bushes, runs off its north end and dries 3 feet at low water.

Pulo Matakong and **Matakong Kechil** stand on the western side of a reef lying $1\frac{1}{2}$ miles eastward of Pulo Kapale, and separated from it by a deep channel; the reef is $2\frac{1}{2}$ miles long, north and south, and steep-to on all sides, except on the west, between the islets, where shoal water extends off a quarter of a mile. Pulo Matakong is three-quarters of a mile long, narrow, wooded, and 130 feet in height. Matakong Kechil, 45 feet high, half a mile northward, is much smaller; the islets are connected by a narrow ridge of sand, drying 3 feet at low water.

Alice channel and the islands to the eastward have already been described. See pages 184, 185.

Pulo Pom pom, lying $4\frac{1}{4}$ miles eastward of Bohi dulong, is a small circular islet with a fairly good summit near the centre 180 feet high to the tops of the trees. The islet is surrounded by a narrow fringing reef, steep-to.

PULO GAIA and **BOHI DULONG**, two high islands standing on the same reef, and almost united, are quite the most

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

striking landmarks seen on approaching Darvel bay; together they form a crescent 4 miles across. These islands, as well as Timbu Mata, can be seen from the northern part of Sibuko bay over the low islands southward of them. They are uninhabited and densely wooded. See View A, on chart 1680.

Bohi dulong, forming the eastern horn of the crescent, has a prominent peak, 1,200 feet high near its southern extremity; the south-western part of Pulo Gaia, forming the western horn of the crescent, rises to a peak 1,540 feet in height, with two slightly lower peaks close to it, presenting remarkable outlines, especially when viewed from the north and east. The eastern part of Pulo Gaia culminates in a conspicuous peak 1,240 feet high; the land between the eastern and western part being low causes Pulo Gaia to appear as two islands from some views.

Tatagan island (*Lat. 4° 36' N., Long. 118° 44' E.*), close off the south-western point of Pulo Gaia, is small, 320 feet high, and partly cleared at the top. On the northern end there is a village, the present residence of the native Chief through whom the British North Borneo Company carry out their dealings with the natives.

Reef.—The reef round Pulo Gaia extends on the north-west side to a distance of nearly $1\frac{1}{2}$ miles from the island, and there assumes the form of a barrier reef enclosing a lagoon full of patches; the reef approaches the shore closely on the north-east side. On the south side of Pulo Gaia the barrier reef trends in a south-easterly direction for $2\frac{3}{4}$ miles from Tatagan island, and thence in a north-easterly direction for the southern point of Bohi dulong. The lagoon south of Pulo Gaia has depths of 7 to 16 fathoms in it, and is fairly clear of patches for a considerable space in the centre.

Anchorage.—In the lagoon south of Pulo Gaia there is anchorage out of the tide in a depth of 10 to 11 fathoms, sandy bottom, east of the village. The passage into the lagoon, one-third of a mile south of Tatagan island, is less than a cable in width, with a depth of $3\frac{1}{2}$ fathoms, but there are no marks for it, and if a small vessel desired for any purpose to enter the lagoon it would be necessary to place boats on the edge of the shoal water as a guide for entering. The north extremes of Sabankat and Salakan islands in line bearing S. 64° W. just touches the north side of the passage.

Anchorage may be had outside the lagoon in a depth of 10 fathoms, half a mile S.W. by S. of Tatagan, but the tidal streams run here with some strength.

Water.—The natives of Tatagan obtain their water from a spring close to the beach near the south-west point of Pulo Gaia.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Mantabuan islet, with its tree tops 100 feet above the sea, stands on the southern end of a detached reef, lying $1\frac{1}{4}$ miles north-east of Pulo Gaia; the reef is $1\frac{3}{4}$ miles in length, north-north-west and south-south-east, is one mile in width, and extends a quarter of a mile south-south-eastward of the islet.

Another detached reef of about the same extent lies one mile further eastward, with deep water around except off its southern extremity, where shoal water extends southward half a mile from the reef. A long sandbank on the middle of this reef dries 3 feet at low water.

A coral shoal with $4\frac{1}{2}$ fathoms over it lies one mile S.E. $\frac{1}{2}$ S. of Mantabuan islet; between this patch and the reef surrounding Pulo Gaia and Bohi dulong there is a channel nearly three-quarters of a mile wide.

Charts 1680, 1681.

Pulo Puan (*Lat. $4^{\circ} 32' N.$, Long. $118^{\circ} 51' E.$*) is a flat-topped wooded island, 130 feet high, one mile in length, north-west and south-east, situated $3\frac{3}{4}$ miles S. by W. from Pulo Pom pom, and near the northern end of a reef which extends nearly $2\frac{1}{2}$ miles in a S.S.E. direction from the island, and dries one to 2 feet in patches. The reef is steep-to on all sides, except at its southern extremity, from which the 10-fathoms line projects for upwards of half a mile.

Baturua reef, to the westward of Pulo Puan, is separated from that island and reef by a deep channel half a mile wide. The reef is of irregular shape, 3 miles long, north and south, and $1\frac{1}{2}$ miles wide near the middle, and dries one to 2 feet in patches at low water. The northern extremity lies 3 miles south-eastward from Bohi dulong island, and from this point a bank of irregular soundings stretches northward for a distance of nearly three-quarters of a mile. Off the southern end there is also shoal water, with a patch of 3 fathoms lying half a mile E.S.E. from the end of the reef.

The tidal streams run very strongly round this reef, and care is necessary in rounding it to avoid being set too near the edge. The channel between this reef and Bulipatuid shoal to the westward is $1\frac{1}{2}$ miles wide.

Salakan and **Sabankat islets** lie on an extensive reef, $6\frac{1}{2}$ miles in length, north-west and south-east, midway between Gaia and Larapan islands. Salakan, 240 feet in height, lies on the south-eastern part of the reef, about $1\frac{1}{2}$ miles south-westward from Tatagan island. Sabankat, with the tops of its trees 160 feet above the sea, is situated $1\frac{3}{4}$ miles west-south-westward of Salakan, and stands on the south-west extremity of the reef, which extends 5 miles north-

General charts 2576, 2660b., 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

north-west and $3\frac{1}{2}$ miles eastward from the islet; two rocks about 5 feet high stand on the reef $1\frac{1}{2}$ miles to the north of Sabankat. The passage between the eastern part of this reef and the Gaia reef is three-quarters of a mile wide.

Maiga islet, 125 feet high, situated $1\frac{1}{2}$ miles north-north-westward from Salakan islet, stands on the south-western edge of a detached reef $1\frac{1}{2}$ miles in length, north-north-west and south-south-east, and half a mile in width; there is a channel nearly one mile wide between it and Gaia reef.

Sibuan islet (*Lat. $4^{\circ} 39' N.$, Long. $118^{\circ} 40' E.$*) is a small wooded islet on the southern end of a reef nearly a mile long, north-north-east and south-south-west, separated by a deep channel three-quarters of a mile wide from the northern edge of the extensive reef on which Sabankat and Salakan stand.

Church reef, awash at low water, is $1\frac{1}{2}$ miles in length north-north-east and south-south-west, and one mile in width, and lies north-westward of Sibuan island reef, from which it is separated by a deep channel three-quarters of a mile wide.

Charts 1680, 1681.

Bulipatuid shoal lies $2\frac{1}{2}$ miles westward from the southern end of Baturua reef. Within 10-fathoms limits it is $1\frac{1}{2}$ miles long, north-west and south-east, and half a mile wide. In the centre of this area there is a space of about 4 cables extent with depths of $4\frac{1}{2}$ and 5 fathoms, but as it is possible there may be shoaler heads on it vessels should not cross this shoal.

Clearing mark.—Mount Tanna Ballu (Timbu Mata) in line with the north extreme of Sabankat island bearing N. 65° W., leads north-east of this shoal.

Pasalat reef, between Gaia and Bum Bum islands, is separated from the edge of the reef fringing Bum Bum island by a channel three-quarters of a mile in width. The reef is one mile in length, east and west, by three-quarters of a mile in width, and is awash at low water. From the north point of the reef Sabankat bears N.W. by W., distant $4\frac{3}{4}$ miles. Shoal water of one to 3 fathoms extends one mile both eastward and westward from the reef.

Larapan island lies $2\frac{3}{4}$ miles westward of Sabankat islet; the tops of the trees on it are nearly of an uniform height of about 200 feet. The channel between Larapan and Langas to the westward is a quarter of a mile in width; the edges of the reef on both sides of it are irregular and broken up.

General charts 2576, 2660b, 1263.

Charts 1680, 1681. Var. 1° 50' E.

Langas island, south of Tanjong Timbu Mata, the south-eastern point of Timbu Mata island, is about $4\frac{1}{2}$ miles in length, north-east and south-west, and is flat-topped and wooded, with a single conspicuous hill 360 feet high at its south-western end. A reef extends from a half to one mile from the northern end, leaving a channel three-quarters of a mile wide between it and the shore reef eastward of Tanjong Timbu Mata. The channel between Langas and the mainland is half a mile in width, and between Langas and another island to the westward of it nearly one mile wide, with a depth of $3\frac{1}{2}$ fathoms. Shoal water extends from 3 to 8 cables off this last island; to keep in the deepest water the S.W. point of Langas should be rounded at the distance of about 2 cables.

Chart 1680, Darvel bay.

TIMBU MATA ISLAND, in the southern part of Darvel bay, is 16 miles long, east and west, with an extreme width of $5\frac{1}{2}$ miles, and is separated from the mainland by Sigalong trusan. The island is densely wooded and mountainous, rising from a low western point to Mount Tanna Ballu near its centre, a sharp conical summit elevated 2,035 feet; this mount, from its height and shape, makes a conspicuous landmark. On the eastern extremity Mount Sidongal (*Lat. 4° 38' N., Long. 118° 35' E.*), a conical mountain 1,605 feet high, is also very conspicuous. *See View A, on chart 1680.*

Tanjong Sidongal (Bluff point).—The shore reef projects one-third of a mile eastward of Tanjong Sidongal, the eastern extreme of Timbu Mata island, and thence curves round in a convex form south-westward to Tanjong Timbu Mata; on this reef there are two low islets.

Shoal.—A coral shoal with $3\frac{1}{2}$ to 5 fathoms on it lies nearly half a mile from the edge of the reef between Tanjongs Sidongal and Timbu Mata, with the extreme of the latter point bearing W.S.W., distant $2\frac{1}{2}$ miles. Vessels should pass south of this shoal; the distance from it to the north end of the reef projecting from Langas island is three-quarters of a mile.

Clearing mark.—The south extreme of the islet, 70 feet high, off Tanjong Timbu Mata, in line with the south extreme of a larger island $2\frac{1}{4}$ miles to the westward, bearing S. 70° W., leads southward of this shoal, and fair in the middle of the entrance to Sigalong trusan.

Tanjong Timbu Mata (Grassy point), the south-eastern point of Timbu Mata island, is formed by a spur from the mountains projecting to the south. Near the water's edge it is fringed with trees, and there are a few trees on the upper part of the ridge. Shoal water extends for a quarter of a mile southward of the point.

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

Anchorage.—The *Egeria* in 1892 anchored in a depth of 12 fathoms, with the point bearing W. $\frac{1}{2}$ S., distant half a mile.

Westward of Tanjong Timbu Mata the coast forms a bay, but it is too much encumbered by reef to admit of its being entered very far. A vessel could, however, doubtless anchor out of the tide in a depth of 6 or 7 fathoms, with the south extreme of the point bearing E. by N. $\frac{1}{4}$ N., distant half a mile, by passing between the shoal water off the point and the reef fringing the small islet three-quarters of a mile south-westward; but this anchorage has not been examined closely.

Water can be obtained from a small spring near the southern extreme of Tanjong Timbu Mata, close to the sea; this appears to be a favourite watering place with the natives.

Channel.—**Sigalong trusan** (*Lat. $4^{\circ}35'N.$, Long. $118^{\circ}30'E.$*), separating Timbu Mata island from the mainland, varies in width from two-thirds of a mile to 3 miles, and is only navigable for launches and small vessels, being barred near the middle by a mud flat with but $1\frac{1}{2}$ fathoms water over it; the channel also is narrow and tortuous.

Directions.—Vessels having occasion to enter Sigalong trusan from the westward proceed between the two rocky patches mentioned on pages 201, 202, steering to pass a little over a cable's length from the edge of the reef skirting the eastern entrance point, and avoiding a patch with $2\frac{1}{2}$ fathoms on it immediately within the entrance point; the depth in this part of the Trusan is from 5 to 6 fathoms. The channel passes to the southward of a wooded island 260 feet high one mile within the entrance, and south of a rock which dries 5 feet at low water, situated 3 cables S.S.W. $\frac{3}{4}$ W. from a second and much smaller islet half a mile within the first. The south shore must not be approached within one-third of a mile after passing this rock.

The deepest water will be found by skirting the north shore at a distance of about 3 cables, and on closing the point abreast of Sipit river, a straight course S.E. by E. $\frac{1}{2}$ E. for $2\frac{1}{2}$ miles to the point on the north shore where the Trusan narrows will lead over the flats in a depth of about $1\frac{1}{2}$ fathoms.

After passing these narrows the water deepens somewhat, but shoals again before approaching a high bluntly conical islet which is passed on its south side at a distance of $1\frac{1}{2}$ cables; it then deepens steadily, and the remainder of the channel northward of Langas island is quite clear and deep between the edges of the reefs. For shoal in eastern entrance and clearing mark, *see* page 209.

From Tanjong Sidongal to the north point of Timbu Mata the coast is deeply indented by bays, but these are greatly encumbered by reef,

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

and the approaches to them are very foul. Vessels should not approach the coast within the 20-fathoms contour line.

Balusuan islet, lying $1\frac{1}{2}$ miles from the north coast of Timbu Mata, and situated 4 miles north-westward from Tanjong Sidongal, is small and 60 feet in height. South of this islet and close to the Timbu Mata shore there is a larger islet 250 feet high. Patches of foul ground and reef extend to a distance of 6 cables north and east of Balusuan, and thence in a south-easterly direction for $4\frac{1}{4}$ miles towards Tanjong Sidongal; this foul ground projects upwards of a mile from the Timbu Mata coast. Vessels should not attempt to pass to the southward of Balusuan.

Pulo Bati Laut, nearly 2 miles in length east and west, and 795 feet in height, is separated from the north point of Timbu Mata by a channel 2 cables wide with a depth of $3\frac{1}{2}$ fathoms in the middle.

Pulo Bati (*Lat. $4^{\circ} 42' N.$, Long. $118^{\circ} 25' E.$*), close off the north-west coast of Timbu Mata island, is 805 feet high, $2\frac{3}{4}$ miles long east and west, densely wooded, with two deep indentations on the south side. Its shores are lined with mangrove. A reef projects $2\frac{1}{2}$ cables north-westward from the west end of the island. Shoal water extends across the channel between Pulo Bati and Timbu Mata.

The western end of Timbu Mata, with the south coast of Pulo Bati, forms a bay, at the head of which there is anchorage in a depth of 13 fathoms; on the south side of the bay there are some small off-lying reefs and shoals.

Hambly reef, nearly in the middle of the entrance to the above bay, is 4 cables long north and south, and awash at low water. The northern end, on which there is a rock that dries 5 feet, lies one mile S.W. $\frac{1}{4}$ W. from the west point of Pulo Bati. Immediately south of Hambly reef there is a small islet 210 feet high one-third of a mile from the Timbu Mata shore, and between it and Hambly reef there is a ledge of foul ground.

Learmonth reef, nearly awash at low water, lies 2 miles S.E. $\frac{1}{2}$ E. from the southern extremity of Silumpat island and midway between that island and Pulo Bati Laut. It is about a quarter of a mile in extent, and usually shows clearly.

Pudsey reefs are two small reefs awash at low water, $1\frac{1}{2}$ miles apart, north and south; the northern reef lies $2\frac{1}{4}$ miles N. 82° W. from the south-west point of Silumpat island; the southern lies $2\frac{1}{10}$ miles S. 60° W. from the same point.

Dawson rock, covered by one fathom at low water, is a small pinnacle rock near the western end of a narrow bank about three-quarters of a mile in length east and west, with a depth of 17 fathoms

General charts 2576, 2660b, 1263.

Chart 1680, Darvel bay. Var. 1° 50' E.

rising from surrounding depths of 25 to 28 fathoms. The pinnacle lies $1\frac{8}{10}$ miles S. 64° E. from Bakuhang islet.

Normanhurst reef, two-thirds of a mile S.W. $\frac{3}{4}$ S. of Bakuhang islet, is a narrow reef, 3 cables long north-east and south-west; it may be passed on either side close to. The west extremes of Maganting and Tanna islands in line, N. 19° W., lead a short distance westward of this reef.

Walton, McKinlay, Rashleigh, and Sheppard reefs are all small coral patches nearly dry at low water, and about $1\frac{1}{2}$ miles apart, forming along with Lawler reef a line which corresponds approximately with the 20-fathoms contour line. The easternmost of these reefs, Walton, lies nearly 3 miles N.N.E. from the west end of Timbu Mata island, with the south-eastern extremes of Tabauwan and Silumpat islands nearly in line.

Chart 2576, Sulu archipelago.

SIBUKO BAY comprises that part of the eastern coast of Borneo between the eastern extremes of Bum Bum and Mandul islands.

Topography.—Westward of the Kumpong river the mountain system on the northern shore of Sibuko bay centres in Mount Magdalena, with its peak situated in lat. 4° 29' 52" N., long. 117° 55' 56" E. This mountain, 4,420 feet in height, is densely wooded to its summit, and presents a sharp peak from all sides.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 0' E.

From Mount Magdalena a high backbone extends in a south-south-easterly direction for 15 miles, terminating in Mount Batu Tinagat, immediately to the northward of Batu Tinagat. On this backbone there are several very conspicuous elevations, notably Mount Lucia 4,070 feet in height, Maria peak 3,680 feet, Mount Andrassy 2,200 feet, and Mount Batu Tinagat 1,390 feet high (*Lat. 4° 15' N., Long. 117° 59' E.*), thus gradually diminishing in altitude towards the coast.

A secondary watershed branching at right angles from the main backbone springs from Mount Lucia; this secondary system curving round to the eastward, and lower in altitude, eventually terminates in Mount Wüllerstorff; whilst to the westward it forms a high ridge, which presently taking a southerly direction terminates in Mount Kukusan (730 feet high) close to the coast $1\frac{3}{4}$ miles north-north-west from Tawao. On this ridge there are three other remarkable elevations.

The first of these, distant $3\frac{1}{2}$ miles from Mount Lucia, is a high saddle, the south-western peak of which, 2,670 feet in height, is

General charts 2576, 2660b, 1263.

(a)

*Mt. Antoinette. Cornelis peak.
Sibetik island.*

Mt. Kusan.

Gemok.

Mt. Putri.

Mt. Batu Tinogal.

Mt. Andragu.

Mt. Lucia.

(c)

Quoin hill.

Pyramid hill.

North Shore of Sibuko Bay, Mount Putri bearing N.W. $\frac{1}{2}$ N., 11 $\frac{1}{2}$ miles; 3 views.

Mt. Willendorf.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 0' E.

slightly the higher; the next is Table mountain, 1,980 feet high, perfectly flat topped, as its name indicates, which is situated nearly midway between Mounts Magdalena and Kukusan. From Table mountain a spur running in a north-westerly direction for $3\frac{3}{4}$ miles terminates in a prominent peak, Tiger hill, 1,550 feet in height. The third elevation is Gemok, also a large flat-topped summit, 1,405 feet high, situated 2 miles N. by W. of Mount Kukusan.

Lesser watersheds also branch away from Mount Magdalena in north-westerly and north-easterly directions.

Chart 1681, Northern shore of Sibuko bay.

Coastmarks.—The principal coastmarks on the northern shore of Sibuko bay are very readily distinguished, and will be briefly noticed. The high summits of over 3,000 feet in height, such as Mounts Magdalena and Lucia, and Maria peak, are frequently obscured by clouds, but those of lower elevation are usually visible. Saddle hill, on the coast, and Mount Wüllerstorf are described on page 218.

Quoin hill, nearly 10 miles from the coast, is in the valley on the eastern side of the main backbone running to the southward from Mount Magdalena and 8 miles west-south-westward from Mount Wüllerstorf; it stands up in the plain very prominently, at an elevation of 1,965 feet.

Chart 2099, N.W. part of Sibuko bay.

Mount Andrassy (Lat. $4^{\circ} 20' N.$, Long. $117^{\circ} 59' E.$), a rounded summit on the main backbone before mentioned, is the first prominent mountain to the northward of the Batu Tinagat hills.

Immediately behind Batu Tinagat there is a range of hills from 1,000 to 1,390 feet in height, and thickly wooded; Mount Batu Tinagat, the northernmost and highest of the range, is situated nearly 2 miles north-north-west from Batu Tinagat. These hills fall steeply to the north, the range appearing isolated from the higher mountains further north.

Mount Putri, 1,020 feet high, is a spur of the Batu Tinagat range, close to the coast, westward of Batu Tinagat.

Mount Kukusan, close to the coast $6\frac{3}{4}$ miles W. by N. from Mount Batu Tinagat, is a very remarkable pyramidal-shaped hill. It is quite unmistakable directly it opens out to the southward of Mount Putri on a W.N.W. bearing, and it remains clearly in view until it begins to close the higher land of Gemok behind. See views *a*, *b*, *c*, at page 212; also *a* and *b*, at page 222.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

Coast.—From Panto Panto point, the eastern extreme of Bum Bum island, the south coast trends west-south-west for 7 miles to the south-western point, forming in the centre a wide indentation about one mile deep, in front of which is an area with depths of from one to 2 fathoms, with many coral patches dry at low water. A reef extends $1\frac{1}{2}$ miles eastward and three-quarters of a mile southward from Panto Panto point, and nearly half a mile from the shore to the westward.

Beaufort reef, of sand and coral, lying to the southward of the eastern part of Bum Bum island, and separated from the reef of that island by a channel two-thirds of a mile wide, is $7\frac{1}{2}$ miles long north-east and south-west, by $3\frac{1}{2}$ miles in width, and dries in patches at low water. On the north-eastern end of this reef stands Omdal islet.

Omdal islet (*Lat. $4^{\circ} 25' N.$, Long. $118^{\circ} 46' E.$*), low and wooded, is about a mile in length, east-south-east and west-north-west, and 6 cables wide. There is a village on its western end, and a break in the edge of the reef allows canoes to enter a small reef harbour.

Shoals.—Two small shoals, $1\frac{1}{2}$ miles apart with depths of 3 and $3\frac{1}{2}$ fathoms on them, lie respectively 2 miles E. $\frac{1}{2}$ N. and $1\frac{3}{4}$ miles S.E. $\frac{1}{4}$ S. from the east point of Omdal islet.

Creagh reef is an extensive flat of sand and coral dry in patches at low water, stretching to the southward and south-westward for $7\frac{1}{2}$ miles from the south-west point of Bum Bum island. On its western edge there are three thickly wooded islets, Manampili, Nusatonga, and Sipangao, 345 to 415 feet in height, and near the centre of the reef is a wooded islet 80 feet high. The reef is barely passable for a large boat at high water.

Silapag passage, between Beaufort reef on the one hand and Bum Bum island and Creagh reef on the other, is from 8 to 13 fathoms deep in mid-channel, with a sandy bottom. The channel trends west-south-westward for 4 miles between Bum Bum and Omdal islands with a breadth of two-thirds of a mile, then turning to the southward for 4 miles between Beaufort and Creagh reefs, it contracts to a width of one-quarter of a mile.

H.M.S. *Satellite* in 1886 anchored in this channel about $1\frac{1}{2}$ cables from the village on Omdal islet, and found it an excellent anchorage, but the tidal streams run through with considerable strength at springs.

The flood stream sets to the southward and westward, and the ebb stream to the northward and eastward.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

TRUSAN TANDO BULONG (Trusan Treacher), between Bum Bum island and Creagh reef on the east and the mainland on the west, is about three-quarters of a mile wide, but the fringing reefs on either side narrow the navigable channel to a width of a quarter of a mile in places. Vessels proceeding to Sibuko river effect a great saving in distance by using this passage; the edges of the reef on each side are, however, very difficult to make out at times, and the tidal streams run through with considerable strength.

From the northern entrance the channel trends in a south-easterly direction for 4 miles, with general depths of 20 to 11 fathoms, but with a bank of 5 fathoms extending two-thirds across the channel from the east side of the entrance; it then curves round gradually and takes a south-westerly direction for 8 miles to the southern entrance, the depth decreasing to 9 and 7 fathoms.

Beacons.—Small wooden tripod beacons have been erected in the following positions:—

Two beacons half a mile apart on the eastern edge of the reef northward of Simporna.

Three beacons on the eastern edge of the reef eastward of Hood hill.

On the south-eastern edge of the reef southward of Hood hill.

On the western edge of the reef off the north-western point of Bum Bum island two beacons are erected nearly half a mile apart, north and south.

On the north-western edge of Creagh reef, about half a mile north-north-eastward of Sipangao islet.

They are not reliable.

Tidal streams.—In Trusan Tando Bulong the flood stream sets to the southward and the ebb to the northward, with a strength of 3 to 4 knots an hour at springs. The streams are strongest in the northern part of the channel between Bum Bum island and the mainland.

Simporna (*Lat. 4° 29' N., Long. 118° 37' E.*) is a small settlement on the west side of Trusan Tando Bulong, 1½ miles within the northern entrance. A pier projects nearly a quarter of a mile over the reef into deep water; the local steamers when visiting Simporna lie alongside this pier, at the shore end of which a conspicuous zinc-roofed house affords a useful mark for making the entrance to the Trusan.

Kuli Babang.—On the west side of Trusan Tando Bulong, at 4 miles within the southern entrance, there is an inlet about 6 cables wide at the entrance, extending in a north-westerly direction for 1½ miles and dividing into two arms; the southern arm is named

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

Kuli Babang, and the northern Lok Bakong. On the eastern shore of the northern arm is Lok Bakong hill, a remarkable conical hill 595 feet in height, forming the western end of a detached range of hills, the easternmost summit of which is Hood hill, 525 feet high, standing on the peninsula round which the Trusan turns. The entrance to this bight is $1\frac{3}{4}$ cables wide between the reefs, and 8 fathoms deep, shoaling to 3 fathoms three-quarters of a mile within the entrance points.

Tagassan bay is a small inlet on the mainland immediately within the southern entrance of Trusan Tando Bulong; the inlet is one mile wide between the entrance points, but the shore reef, which dries out from Tanjong Tutop about 3 cables, and a mud flat extending half a mile from the northern entrance point narrow it considerably. On the northern shore of the inlet there is a little cleared grassy land where a village formerly stood, this spot is called Pakalangan; close to the beach there is a well with good water.

Tides.—It is high water in Tagassan bay at full and change at 6h. 0m.; springs rise $7\frac{1}{2}$ feet, neaps rise $4\frac{1}{2}$ feet, neaps range $1\frac{3}{4}$ feet. The tides are affected by diurnal inequality, the greatest difference between two successive high waters being 2 feet; this is attained when the moon is at her greatest declination, north or south. When the sun is north of the equator the highest high water is the a.m. tide; when the sun is south of the equator the highest high water is the p.m. tide.

Daisy islet (*Lat. 4° 28' N., Long. 118° 38' E.*), standing near the edge of the fringe reef on the east side of Trusan Tando Bulong, about $2\frac{3}{4}$ miles within the northern entrance, is noticeable on approaching the Trusan from the northward.

Directions for Trusan Tando Bulong.—Approaching from the northward:—After passing between Larapan and Sabankat islands the entrance will easily be identified by Hood hill lying right over it; there are no hills on Bum Bum island. From a position with the eastern extremity of Timbu Mata island over the centre of Larapan island, and the north-west extremes of Pulo Gaia and Sabankat in line, the opening between the reefs which extend off both sides of the entrance will be easily distinguished; the zinc-roofed house at Simporna will also be plainly seen and may be steered for on a S. $\frac{1}{2}$ E. bearing. See Beacons, on page 215.

This course will lead over the tail of a 5-fathoms bank running off from the eastern entrance point, which bank will have been passed when the northern point of Bum Bum island is abeam bearing E. $\frac{1}{2}$ N., and then a mid-channel course may be steered to pass the end of the

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

pier at Simporna at a distance of one cable, whence a straight course S.E. $\frac{1}{2}$ S. for the point in the channel under Hood hill will pass 2 cables west of Daisy islet. The fringe reef extends about one cable east of the above (Hood hill) point and may be rounded at a reasonable distance, the channel being 4 to 5 cables in width.

South of the point the reef projects from the west shore 3 to 4 cables, but on the Bum Bum island side the fringe reef skirts the shore at from $1\frac{1}{2}$ cables to half a cable distance. A course steered for the summit of Sipangao islet bearing S. 35° W., leads upwards of a cable from the edge of the reef off the south-west point of Bum Bum island, and continued leads the same distance from the reef on the west side, south of Hood hill. The beacons on the western side of the channel will assist the navigation here.

Abreast of Sipangao islet the channel is upwards of three-quarters of a mile wide, and the ship's position can be readily fixed on the chart. The only known dangers outside the reefs on either side are two small coral patches on the east side; one patch lies N.W. of Sipangao islet and 2 cables beyond the edge of the reef; the other lies West of the south end of Nusatonga islet and $1\frac{1}{2}$ cables beyond the edge of that part of the reef.

Gusungan islet (*Lat. $4^{\circ} 19'$ N., Long. $118^{\circ} 33'$ E.*), situated 2 miles south of Tanjong Tutop, is a small sand cay 3 feet high with a few low shrubs on it, standing on the north-western extremity of a reef one mile long, north-west and south-east, and 4 cables wide, which partly dries at low water.

Leading mark.—The channel between Gusungan islet and the south-west point of Creagh reef is about half a mile in width; vessels using it should bring the northern summit of Double hill over the west extreme of the rocky point forming the western extremity of Tanjong Tutop, bearing N. 53° W., which leads fairly between the reefs, the edges of which when the sun is low or ahead are not easily distinguished.

Double hill is a saddle-shaped hill 760 feet in height, standing on a ridge between the Pöck range (which shows on the sky line) and the coast ridge, and is generally quite easy to identify from its position and shape.

Coast.—From Tanjong Tutop, the south-western entrance point of Trusan Tando Bulong, a rocky coast backed by high hills trends westward for $2\frac{1}{2}$ miles to near the entrance of a small river, and thence a mangrove coast with low ground behind it sweeps in a gentle curve to another rocky point, Delconté point or Tanjong Nagos, $8\frac{1}{2}$ miles W. by S. from Tanjong Tutop. Immediately above Delconté point there is a wooded range from 840 to 1,200 feet in height.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

Westward of Delconté point the coast recedes, forming a bay 5 miles across into which flows the River Kumpong.

Silungan is a small and wooded islet, 170 feet in height, lying $1\frac{1}{2}$ miles from the coast and 6 miles west-south-westward from Tanjong Tutop.

Kumpong Kumpong island, lying at the mouth of Kumpong river, is $1\frac{1}{2}$ miles in length, north-west and south-east, densely wooded, and has a summit near its centre 280 feet high. The main entrance to the Kumpong river is on the eastern side of the island; the narrow channel separating Kumpong Kumpong island from the mainland on the western side nearly dries at low water.

Kumpong or Pallas river.—There is not more than 3 or 4 feet water on the bar of this river at low water, but within the entrance the river has depths of from $1\frac{1}{2}$ to 6 fathoms. On entering it appears a fine broad river with two branches, uniting at $2\frac{1}{2}$ miles from its mouth and enclosing a long narrow island.

The river was ascended by the steam cutter of the *Egeria* for 8 miles from the mouth, at which point the water was brackish. Further progress was barred by the banks narrowing, and by the interlacing of the foliage overhead, but there was still a depth of 2 fathoms water. Two branches of the river taking a southerly direction were also explored, both ending similarly in deep narrow creeks.

The mangrove ceases at 4 miles from the mouth; higher up the banks are clothed with nipa palms, with occasionally a red earthy bank appearing on one side and swamp on the other. The river is singularly free from snags or obstructions of any kind. From the topography of the country it must drain a considerable area. There were no signs of inhabitants.

Saddle hill (*Lat. $4^{\circ} 18' N.$, Long. $118^{\circ} 12' E.$*).—Westward of Kumpong Kumpong island a low mangrove shore trends to the westward for $8\frac{1}{2}$ miles to a coast ridge named Saddle hill, the eastern hump of which is 330 feet, and the western 450 feet in height.

Mount Pöck, 1,860 feet high, is the summit of the ranges on the eastern side of the valley of the Kumpong river, and is the westernmost peak of a mountainous range extending north-east and south-west about 6 miles northward of Delconté point, and separated from the mountains immediately behind that point by a deep valley.

Mount Wüllerstorf, rising 17 miles westward from Mount Sinalong, is 2,500 feet in height with a conical summit, and standing 10 miles from the coast forms one of the most conspicuous mountains on the northern side of Sibuko bay. It falls steeply to the eastward to the plains below, but a range of mountains from 2,115 to 1,680 feet

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

high (the latter height being a remarkably sharp cone $5\frac{1}{4}$ miles from Mount Wüllerstorf) stretches north-north-west from it, between which and the low spurs of the mountains to the eastward is a valley 7 miles wide, through which the Kumpong river takes its course. The entire district is covered with extensive forest. See views *c*, at page 212, and *a*, at page 222.

Balung or Baluk river, which emerges through the coast immediately to the westward of Saddle hill, is about three-quarters of a cable in breadth at the mouth, widening to 2 cables within the entrance. It takes its rise between Mounts Wüllerstorf and Lucia, and flows in a southerly and easterly direction to the foot of one of the spurs running down from Mount Wüllerstorf, and thence turns south towards Saddle hill. The course of this river was traced by the steam cutter of the *Egeria* for 6 miles, or about 4 miles in a direct line from the coast, at which point the river was 30 yards wide with a depth of $1\frac{1}{2}$ fathoms, further progress being barred here by a fallen tree. In the lower reaches there is a depth of 3 to 5 fathoms; the mangrove swamp extends to about $1\frac{1}{2}$ miles from the coast; for the remainder of the river's course, as far as it was traced, the banks are lined by nipa palms.

The entrance to the river lies between two banks of sand and mud projecting in a southerly direction from the mouth; the bank on the eastern side dries for a considerable distance; that on the western side has 2 to 6 feet of water on it; the narrow channel between the two banks carries a depth of $1\frac{1}{2}$ fathoms at low water. The southern point of the eastern bank lies $2\frac{1}{4}$ miles S. $\frac{1}{2}$ E. from the western peak of Saddle hill.

OFF-LYING ISLANDS and DANGERS.—Northern side.—**Webb shoal** (*Lat. $4^{\circ} 24' N.$, Long. $118^{\circ} 53' E.$*), lying nearly midway between the southern end of Pulo Puan reef and Si Amil island, is about one mile in extent within the 10-fathoms limit, with depths of 7 and 8 fathoms generally, and a patch of 5 fathoms near its southern end. This patch, which lies $5\frac{1}{4}$ miles north of Si Amil island, is the least depth found, but the shoal was not examined with sufficient minuteness to justify ships crossing it.

LIGITAN GROUP is a group of islets and reefs lying off the north coast of Sibuko bay, extending over a distance of 16 miles, east and west, from Si Amil to Mabul island, and separated from the Beaufort and Creagh reefs by the Ligitan channel. The area included within the limits of this group comprises on its eastern side an extensive reef, roughly triangular in shape, on the northern end of which stands Danawan island, and on the south-eastern part Ligitan islet. The southern part of the reef dries in patches one to 2 feet.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

From Danawan island the reef extends in a south-south-westerly and southerly direction for 10 miles, projecting to the eastward with shallow water half a mile outside the edge of the reef in places on which the sea breaks heavily, and along which there are tide ribs and overfalls. The water in the vicinity being considerably discoloured and the examination of the edge being somewhat of an open nature, the reef should not be approached very closely.

A patch, with a depth of $2\frac{3}{4}$ fathoms, is reported to lie half a mile to the southward of the south-east extremity of the reef in lat. $4^{\circ} 7\frac{1}{2}'$ N., long. $118^{\circ} 53\frac{3}{4}'$ E.

Si Amil island (Lat. $4^{\circ} 19'$ N., Long. $118^{\circ} 53'$ E.), the north-easternmost island of the group, situated $8\frac{3}{4}$ miles south-eastward from Omdal island, is half a mile in diameter, 355 feet high, and thickly wooded. On its western side there is a sandy spit, and off the north-west point a reef extends for 2 cables leaving a passage 2 cables wide between the reefs of Si Amil and Danawan islands. The island is uninhabited, and uncultivated except for numerous mango trees in the valley on the west side.

Danawan island stands near the northern point of the main reef half a mile south-westward of Si Amil; it is low, wooded, and flat-topped. On the western side there is a village, and yams, sweet potatoes, mangoes, and bananas are cultivated, but the island is only accessible by boats on the eastern side, where the reef closely approaches the shore.

On the eastern side of Danawan there is a bay in the reef protected by Si Amil island, but the water is deep, there being 30 fathoms midway between the two islands; anchorage, however, can be obtained in a depth of 16 fathoms at $1\frac{1}{2}$ cables from Danawan.

Ligitan islet, $1\frac{3}{4}$ miles from the south-east point of the main reef, and 9 miles S. $\frac{1}{2}$ E. from Si Amil island, is small, 30 feet in height, and is situated near the southern end of a narrow sandbank that dries 4 feet at low water; there are a few bushes on it. A sandbank that dries 3 feet lies $2\frac{3}{4}$ miles northward of the islet.

Tidal streams and overfalls.—Off the southern end of the reef the streams run from 2 to 3 knots, causing very heavy overfalls and whirls; caution should therefore be exercised in approaching this end of the reef, especially as the marks for fixing the position are distant.

Foul ground.—From its southern extremity the edge of the reef turns sharply to the northward, leaving Ligitan island half a mile to the eastward, and then turns sharply again to the westward for 7 miles, thus forming a deep bight which ends at the south-west point of the reef. Foul ground and shallow water extend westward for

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay.

2½ miles from the south-west point, and, as the sea does not generally break over the edge, which falls very steeply down into deep water, the danger limit cannot always be distinguished. From the south-west point the edge of the reef trends away north-eastward to Danawan island.

Cust reef, awash at low water, is 1½ miles in length east and west; its north point lies 5½ miles N. 62° E. from **Mabul** island. Several little detached patches lie about a quarter of a mile off the northern side of this reef, which therefore should not be approached closely, nor on passing it should the water be shoaled to less than 10 or 12 fathoms.

South-east of Cust reef, and separated from it by a narrow channel, is a larger reef, 2½ miles long, east and west, and one mile in average breadth, the edge of which has not been closely examined, but it appears to be foul to a distance of half a mile from the reef on all sides. The channel eastward of this reef, between it and a projecting spur of the main reef, is 2 miles wide, but although no detached patches were actually found in it, yet the survey of this portion of the group was of too general a character to justify vessels venturing in this channel or the other passages between the reefs.

Kapalai islet is a small sandy islet with bushes on it 40 feet high, lying 12 miles west-south-westward from Si Amil, and standing on the north-eastern part of a detached reef situated midway between **Mabul** islet and the south-west point of the main reef. A sandbank extends from either end of the islet, and dries 3 feet at low water.

The passage between **Kapalai** reef and the foul ground off the south-west point of the main reef is 1¼ miles wide, but is obstructed in the middle by a patch of 5 fathoms, and it is possible that there may be other patches with less water.

Mabul island (*Lat. 4° 15' N., Long. 118° 38' E.*), the westernmost of the Ligitan group, lies 3½ miles west-north-westward from **Kapalai** islet; it is small and densely wooded, the tree tops being 160 feet high, and stands near the northern end of **Mabul** reef, which extends three-quarters of a mile southward from the islet.

The passage between **Mabul** reef and **Kapalai** reef to the south-east is 2 miles wide, with 4 to 5 fathoms on either side, and 6½ fathoms in a narrow channel about one-third of the distance across from the **Mabul** side. Nothing less than 4 fathoms has been found on either side of the channel (except close to the reefs), but the examination has not been sufficiently exhaustive to determine that there is not a less depth, and therefore it would be well to use **Mabul** passage on the west side of **Mabul** island in preference.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

Mabul passage, westward of Mabul islet, is the channel between the Ligitan group to the eastward and Ligitan reefs to the westward. It is $3\frac{1}{2}$ miles broad, but is obstructed in the middle by a bank with $3\frac{1}{4}$ fathoms on it; on the eastern side of the passage there is another bank with a depth of $4\frac{1}{4}$ fathoms. The deepest part of the passage lies between these two banks, and carries a depth of 7 to 8 fathoms right through.

Mount Sidongal (on the eastern extreme of Timbu Mata island) in line with the west extreme of Sipangao island bearing N. 5° W., leads through Mabul passage and to the westward of Collins patch.

Collins patch (*Lat. $4^{\circ} 16' N.$, Long. $118^{\circ} 37' E.$*), lying $1\frac{1}{2}$ miles N. 59° W. from Mabul island, is a small coral head with a depth of $2\frac{3}{4}$ fathoms, rising from a narrow bank of sand and coral extending within 10-fathoms limits for a distance of $2\frac{1}{2}$ miles north-west and south-east. Another coral patch on the same bank with $4\frac{3}{4}$ fathoms on it lies three-quarters of a mile N. 62° W. from Mabul island.

Caution.—Collins bank should not be crossed by a ship unless there is some necessity for it, as the soundings on it are uneven, and it is possible that other shallow spots may exist, notwithstanding that it has been examined somewhat closely.

LIGITAN CHANNEL, between the Ligitan group on the south and Beaufort and Creagh reefs on the north, is 18 miles in length in a W. by S. and E. by N. direction, and varies in width from 6 miles abreast of Si Amil island to $1\frac{1}{2}$ miles at its western entrance, between Gusungan islet and the projecting horn of the easternmost Ligitan reef.

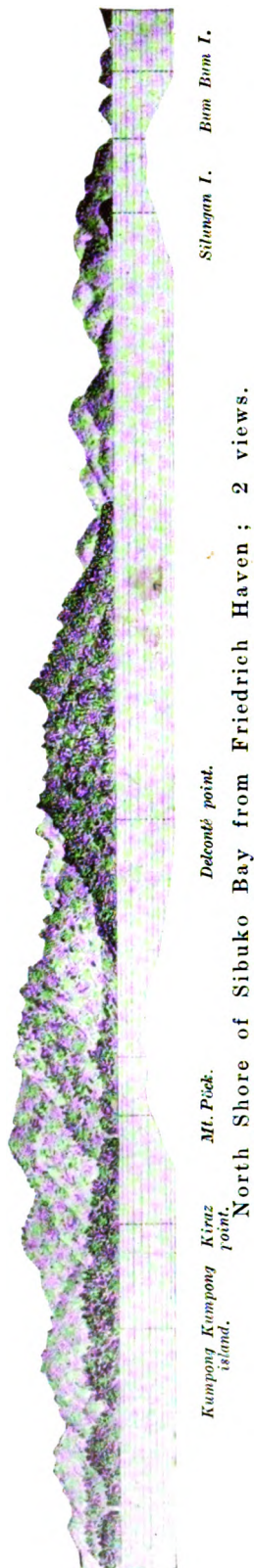
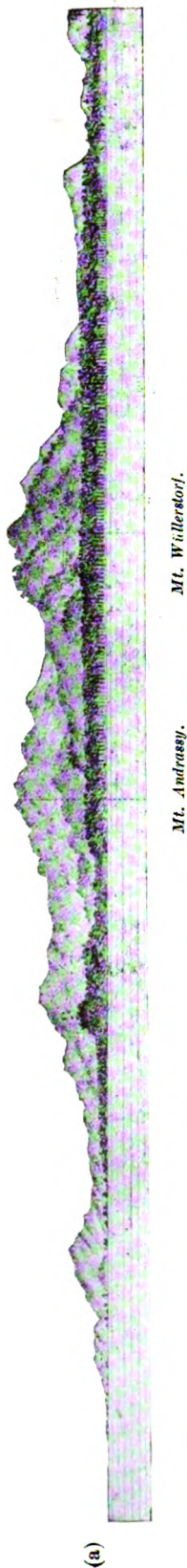
The general depths in the eastern part are from 11 to 14 fathoms, with patches of 6 to 10 fathoms, and further to the westward there are 18 to 20 fathoms, shoaling again to 9 and 12 fathoms at the western entrance. Except Collins patch, already mentioned, no dangers have been discovered in the channel except close to the edges of the reefs, but north, north-east, and north-west of Mabul island the ground is very uneven and rocky, and such being its character, the shoaler parts of the banks shown on the charts should be avoided if possible.

Tidal streams.—In Ligitan channel the flood stream runs to the southward and westward, and the ebb stream to the northward and eastward, with a strength of one knot per hour at springs.

On one occasion whilst the *Egeria* was at anchor during two days at spring tides, with high winds, in the Mabul passage the tidal streams were observed to set as follows:—

At moon's superior transit	-	Slack water.
At 3h. after „ „	-	N.N.E. max. velocity 1.2 knots.
At 6h. „ „	-	E.N.E.

General charts 2576, 2660b, 1263.



Silungan I. Bom Bom I.



Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

At 9h. after superior transit	- E.S.E.
At 12h. „ „ „	- S.S.E.
At 15h. „ „ „	- S.S.W. max. velocity 0·9 knots.
At 18h. „ „ „	- S.W.
At 21h. „ „ „	- S.W.
At 24h. „ „ „	- N.W. gradually changing to north.

This feature of a circular tide once in 24 hours was not observed elsewhere.

SIPADAN ISLET, situated $7\frac{1}{2}$ miles South from Mabul island, is a small wooded islet, 165 feet high to the tops of the trees, standing on the north-west side of a reef one mile long north and south with 20 to 40 fathoms close to the reef, dropping into depths of over 300 fathoms at less than half a mile from the islet. Turtle frequent this islet in considerable numbers.

LIGITAN REEFS are a series of detached reefs, with shoal water between them, fronting the north coast of Sibuko bay at a distance of from $3\frac{1}{4}$ to 7 miles from the shore; from Mabul passage they extend a distance of 9 miles to the westward. On the south side of these reefs the bank on which they stand drops steeply down into deep water.

The north extreme of Silungan island in line with the summit of a mountain above Delconté point, bearing N. 70° W., leads north-east of Ligitan reefs.

Near the middle of the Ligitan reefs there is a break in their continuity 2 miles wide, and through the western side of this opening there is a channel which, although not closely examined, appears from the soundings to be navigable.

Erzherzog reef (*Lat. 4° 15' N., Long. 118° 24' E.*), west of Ligitan reefs, and separated from them by a deep channel 6 cables wide, is $1\frac{1}{2}$ miles in length, east-north-east and west-south-west, and has on its northern side a sand cay which dries 6 feet.

A small detached reef lies half a mile north-eastward of Erzherzog reef.

Friedrich reef is a small detached reef with a sand cay on its northern side which dries 7 feet at low water. It lies $4\frac{1}{4}$ miles South of Kumpong Kumpong island, and $1\frac{3}{4}$ miles westward of Erzherzog reef, with a clear passage between.

Roach reefs are two reefs of small extent, a quarter of a mile apart, standing just within the 100-fathoms contour line, about $9\frac{3}{4}$ miles S.E. from the western summit of Saddle hill; the north-easternmost and larger of these reefs dries 3 feet at low water. At

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

1½ miles north-eastward from the north-eastern reef there is a coral patch with 4 fathoms on it.

Between Roach reefs and Egeria shoal there is a clear passage 3 miles wide.

Alert patches, extending from one to 4¾ miles S. 62° W. from the western Roach reef, are three banks with coral patches of 4 fathoms on them, and depths of 25 to 37 fathoms between the shoals.

Darby bank (*Lat. 4° 7' N., Long. 118° 14' E.*), lying 1½ miles southward of the south-westernmost Alert bank and one mile within the 100-fathoms contour line, makes the southern limit of the banks on the north side of the channel leading to Tawao. Within 10-fathoms limits it is one mile long, east and west, and half a mile wide; the least depth found on it was 6 fathoms, over coral, near its centre, with the western peak of Saddle hill bearing N. by W., distant 11½ miles.

Caution.—Although the least depth obtained on Darby bank was 6 fathoms, and on the Alert banks 4 fathoms, yet as a matter of prudence it is always inadvisable to cross such shoals in any vessels but those of very light draught, and it is perfectly easy to avoid crossing them by bearings of Saddle hill and Mount Batu Chinaga, which are well-placed and unmistakable marks.

Chance rock, a small coral head with 1½ fathoms over it at low water and 13 fathoms around, lies midway between Friedrich reef and Egeria shoal; from it the sand cay on Friedrich reef bears N. 73° E., distant 2¾ miles.

Egeria shoal is a small patch with a depth of 2 fathoms near its centre, situated with the western peak of Saddle hill bearing N. 40° W., distant 6¾ miles.

A small reef, nearly awash at low water, lies three-quarters of a mile north-north-west from Egeria shoal.

Reef.—Beacon.—A narrow reef about 4 cables in length, north and south, and marked by a beacon on its southern end, lies 2 miles south-west of the south end of Kumpong Kumpong island.

Lehnert reef.—Beacon.—Lehnert reef is a small reef of sand and coral drying 2 feet near its southern end, on which is a beacon; from it the western peak of Saddle hill bears N. 65° W., distant 5 miles.

Caution.—The four dangers: Chance rock, Egeria shoal, Lehnert reef, and Heel reef, are all of them difficult to discern under certain conditions of light, on account of the muddiness of the water about them.

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

Heel reef is a very small patch of rotten coral and mud, drying 2 feet at low water, and with 6 to 16 fathoms close around. From it the western peak of Saddle hill bears N.W. by N., distant $4\frac{2}{10}$ miles.

Shoal.—A shoal of sand and coral, with a least depth of one foot, is situated $2\frac{1}{2}$ miles S. 37° W. from Heel reef; it is about 3 cables long in an east and west direction, and $1\frac{1}{2}$ cables wide, with a general depth of from $1\frac{1}{2}$ to 3 fathoms, and 12 to 14 fathoms around.

HAND ROCK is the most serious of all the dangers bordering the approaches to the Tawao channel from the eastward. It lies on the edge of the 20-fathoms contour line, 3 miles west of the southwesternmost Alert patch. The rock itself is about a cable in length, east and west, and half a cable wide, is barely awash at low water, and stands on the middle of a small coral bank with 5 to 10 fathoms over it and 15 to 20 fathoms around; from it the western peak of Saddle hill bears N. 3° E., distant $9\frac{1}{2}$ miles.

Beacon.—A steel beacon with a globe topmark has been erected on Hand rock.

Chart 2099, N.W. part of Sibuko bay.

Clearing mark.—Mount Kukusan kept well open to the southward of Mount Putri, and bearing N.W. by W. $\frac{1}{2}$ W., leads to the southward of Darby bank and Hand rock.

Chart 1681, Northern shore of Sibuko bay.

Friedrich haven (Lat. $4^\circ 16'$ N., Long. $118^\circ 24'$ E.).—The channel between Ligitan, Erzherzog, and Friedrich reefs, on the south side, and the northern shore of Sibuko bay on the north side, is 18 miles long from Trusan Tando Bulong to Egeria shoal, and, between the 5-fathoms lines, varies in breadth from 4 miles to one mile, with general depths of from 6 to 14 fathoms, mud. The narrow part of the channel is between the western horn of the Ligitan reefs, which projects to the north, and the shore bank, which shoals gradually; hereabouts the depths are greater, being from 8 to 26 fathoms. The horn of Ligitan reefs can generally be distinguished, and is steep-to.

On the north side the 3-fathoms line projects for $2\frac{3}{4}$ miles south-south-eastward of Kumpong Kumpong island, and passes one-third of a mile outside Silungan islet.

Friedrich haven is the anchorage immediately off the Kumpong river and nearly in the middle of the channel, about $1\frac{1}{2}$ miles north of Erzherzog reef, where the depths vary from 4 to 15 fathoms.

Anchorage.—There is anchorage in Friedrich haven in 6 fathoms, mud, with the summit of Mount Connor in line with the

General charts 2576, 2660b, 1263.

Chart 1681, Northern shore of Sibuko bay. Var. 1° 50' E.

north extreme of Silungan islet, bearing N. 53° E., and the summit of Kumpong Kumpong island N. 38° W. See view *b*, at page 222.

Directions.—From the westward.—The summit of Mount Connor (on the western side of Trusan Tando Bulong) in line with the north extreme of Silungan islet, bearing N. 53° E., leads up to the anchorage in Friedrich haven, passing between Egeria shoal and Roach reef, and close to the north-westward of Friedrich reef; the sandbank on that reef will generally be seen on approaching it. After passing Friedrich reef the summit of Manampili island kept on a N. 65° E. bearing will lead in mid-channel two-thirds of a mile to the northward of the projecting western horn of the Ligitan reefs.

Tides.—It is high water at full and change in Friedrich haven at 6h. 0m.; springs rise $7\frac{1}{2}$ feet, neaps $4\frac{1}{2}$ feet.

Tidal streams.—The flood stream sets to the southward and westward, and the ebb to the northward and eastward, with a velocity of three-quarters of a knot an hour.

Chart 2099, N.W. part of Sibuko bay.

Coast.—From Balung river a mangrove coast fronted by a mud flat that dries for one-third of a mile from the shore, trends west-south-west for 12 miles as far as Batu Tinagat, and is only intersected throughout this length by the small River Apas (*Lat. 4° 15' N., Long. 118° 5' E.*). The bar at the mouth of this little river, which lies 5 miles from Batu Tinagat, has but one foot of water on it at low tide, and a whale boat was only able to ascend it for one mile.

Charts 1681, 2099.

English spit.—The 3-fathoms line follows the coast from off Kumpong island to off Saddle hill at a distance of about 2 miles, with rocky ledges at its edge in places. From off Saddle hill it runs westward and then curves southward and south-eastward, increasing its distance from the shore to $5\frac{1}{2}$ miles at a position 7 miles south-south-west from Saddle hill; here it makes a sharp elbow, known as the English spit, and turns in a westerly direction towards Batu Tinagat, passing that point at the distance of two-thirds of a mile.

The 5-fathoms contour line, which is close to the 3-fathoms line off Saddle hill, makes a similar elbow at 2 miles southward of English spit, and again closes the 3-fathoms line off Batu Tinagat.

Chart 2099, N.W. part of Sibuko bay.

A bank of sand and mud, awash at low water and $2\frac{1}{4}$ miles long, east and west, lies $1\frac{1}{4}$ miles from the coast between Batu Tinagat and Apas river; its western extreme is situated 2 miles E. $\frac{3}{4}$ S. from Batu Tinagat.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

Batu Tinagat (*Lat. 4° 13' N., Long. 118° 0' E.*) is a small mushroom-shaped rock rising from the sea off a point formed by a spur of the Batu Tinagat hills; it is 15 feet high and bare. The point is the north-east entrance point of the strait separating Sibetik island from Borneo. From one mile westward of Batu Tinagat the shore trends back a little to the northward of West, forming a bay $4\frac{1}{2}$ miles wide to the entrance of the River Tawao, the mouth of which is much concealed by the mangroves fronting it. The shore of the bay eastward of Tawao river consists of mangrove, fronted by mud flats which dry off to the distance of from a quarter to upwards of half a mile.

Tawao.—The settlement of Tawao on Tawao point is $1\frac{1}{2}$ miles westward of the Tawao river entrance. There is a government station here, where the District officer resides. The pier projects in a S. 14° W. direction, and has a depth alongside of about 18 to 20 feet.

Light.—A *fixed* light of small power is exhibited from a pole about 20 feet high at the end of the pier, showing *green* to the westward, *white* to the southward, and *red* to the eastward. It is visible about 2 miles in clear weather, and is unwatched.

Communication.—The N.D.L. steamers call here monthly from Singapore, this being their last port of call outwards; coasting steamers from Sandakan generally call about every ten days. There is no telegraph or telephone.

Trade.—The trade at present is small, being principally confined to jungle produce and the timber industry.

Anchorage.—Vessels usually anchor in 13 fathoms about 3 cables off Tawao pier, with its extreme bearing N. 25° E.; smaller vessels may anchor closer to the pier, bearing in mind that the edge of the bank is steep and shoals suddenly. Steamers usually berth at the pier.

Shoals.—**Swirl patch** is a narrow patch, a quarter of a mile long east and west, with a least depth of $2\frac{1}{4}$ fathoms, over coral, and $5\frac{1}{2}$ to 7 fathoms around, lying $1\frac{1}{4}$ miles from the coast between Batu Tinagat and Tawao. From the shoalest spot Mount Kukusan bears N. 55° W., and the west summit of Saddle hill is in line with Batu Tinagat, N. 68° E. This patch makes itself visible by the swirl and eddies of the tide over it.

Moysey shoals, with a least depth of $4\frac{3}{4}$ fathoms, lie about 9 cables S.S.W. of Tawao river entrance.

Harbour shoals comprise several small patches of from $3\frac{1}{2}$ to 5 fathoms inside the 10-fathoms line, situated north-west from the Moysey shoals; from the westernmost shoal spot of $3\frac{1}{2}$ fathoms the extreme of Tawao point bears N. 44° W., distant $8\frac{1}{4}$ cables.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

Wicks rock, awash at low water, lies 3 cables off-shore on the edge of the 5-fathoms line, out of the track of vessels, with Tawao point bearing S. 54° E., distant 6¼ cables.

Tides.—It is high water, full and change, at Batu Tinagat at 6h. 0m.; springs rise 8½ feet, neaps rise 5½ feet. At Tawao, 7 miles further up the strait, it is high water, full and change, at 6h. 50m.; springs rise 11 feet, neaps rise 6 feet.

Tidal streams.—Off Tawao the ebb stream commences about half an hour after high water by the shore, and has a maximum velocity of 2¾ knots at springs; the flood stream commences three-quarters of an hour after low water by the shore, and attains a maximum velocity of 1¾ knots at springs.

Between Balung river and Sibetik island the flood stream, southward of English spit, runs to the west-north-westward half a knot and the ebb stream to the east-south-eastward at the rate of three-quarters of a knot an hour; off the east end of Sibetik island the flood stream sets north-west 1¼ knots and the ebb south-east 1½ knots an hour.

Chart 1681, Northern shore of Sibuko bay.

Directions from Friedrich haven to Tawao.—**The inner route** passes south of Lehnert reef and north of Heel reef, and is perhaps the most convenient route to follow, as the shore marks are comparatively near and well in view. From a position one mile northward of Friedrich reef, the sand cay on which will be distinguished, a course W. by S. will lead two-thirds of a mile south of Lehnert reef, marked by a beacon, and the same distance north of Heel reef; and when Saddle hill bears N. by W. ½ W., a course S.S.W. ½ W. for 7½ miles will pass one-third of a mile south-eastward of the elbow in the 5-fathoms line off English spit, also about a mile north-westward of the shoal lying 2½ miles south-westward of Heel reef, and nearly 1½ miles to the north-west of Hand rock, which is marked by a beacon; the two latter dangers are specially to be guarded against. The soundings give ample warning on approaching the south-east side of English spit, and maintaining a depth of 7 to 8 fathoms will ensure passing it at safe distance.

Chart 2099, N.W. part of Sibuko bay.

On opening out Mount Kukusan (*Lat. 4° 16' N., Long. 117° 53' E.*) well clear to the southward of Mount Putri bearing N.W. by W. ¾ W. a vessel should steer W. by N. ¾ N. up the channel; and on arriving off Mount Putri should take care not to bring Mount Kukusan to the westward of N.W. ¾ W. in order to avoid Swirl patch, which danger will be passed when Saddle hill is lost sight of beyond Batu Tinagat. Mount Kukusan, seen to the westward of Tawao point, bearing N. 5° W., leads towards the anchorage, westward of the Moysey

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

and Harbour shoals, and when the extreme of the pier bears N. 25° E. the anchorage can be steered for. *See page 227.*

The outer route from Friedrich haven passes to the southward of Chance rock and Egeria shoal, and between Alert patches and Hand rock. Keeping Mount Connor in line with the north extreme of Silungan islet, bearing N. 53° E. astern, a straight course leads three-quarters of a mile to the southward of the beacon on Hand rock, and in clear weather no difficulty will be experienced in fixing the position of the ship by cross bearings.

SIBETIK ISLAND is about 20 miles in length in a west-north-west and east-south-east direction and about 7 miles in average width; it is separated from the mainland to the north-east by a strait $3\frac{1}{2}$ to 5 miles wide, but to the north-westward of the island there is only a narrow channel half a mile in width separating it from the Serudong delta on the mainland. A range of densely wooded hills traverses the island throughout its length, the highest point of this range, Mount Antoinette, 1,550 feet in height, is in the middle. Cornelis peak (*Lat. 4° 7' N., Long. 117° 54' E.*), 550 feet high, near the eastern end of the island, is a somewhat conspicuous point when viewed from any direction to the southward of south-west, but is less remarkable from other views. View *a*, at page 212.

The boundary line between British and Dutch territories on the parallel of lat. 4° 10' N. passes nearly through the centre of Sibetik island.

Cowie bay is the name given to an extensive sheet of water lying to the westward of Tawao and Saima point; at its head is a shallow delta intersected by a labyrinth of creeks, the shores of which are everywhere lined with mangroves, and into which many rivers discharge, the principal being the Kalabakang. The bay was surveyed during 1909 and 1910 by H.M.S. *Merlin* as far as the limits of navigation, 12 miles beyond Tawao, above which the bay becomes blocked across its entire breadth by numerous mud flats, between which are intricate channels impracticable for navigation. Both shores of the bay consist of low mangroves fronted by extensive mud flats, and present no distinguishing features. The depths in Cowie bay are everywhere regular, the bottom being soft mud.

North shore.—From Tawao the coast trends in a general west-north-west direction for 12 miles (the limits of the survey), and is intersected by numerous small creeks and rivers, the principal of which is the Murotai, 7 miles from Tawao, which can be ascended by launches for about 3 miles at high water.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

South shore.—Saima point (*Lat. 4° 11' N., Long. 117° 53' E.*), immediately opposite Tawao, is a low mangrove point not readily distinguished. From here the coast trends in a west-north-west direction for 7 miles to Prescott point, forming a slight shallow bight; it then takes a westerly trend for 7 miles to Grassy point.

At half a mile north-north-east from Saima point there is a small sandbank that dries 4 feet at low water, with a depth of 6 fathoms between it and the shore.

Grassy point is somewhat conspicuous, being the first hard ground met with, appearing as a grassy opening of flat land fronted by clay cliffs 30 feet high. For a distance of one mile north-east from Grassy point shoal water extends upwards of 3 cables from the shore.

Kalabakang river, flowing into Cowie bay, the north-west arm of Sibuko bay northward of Sibetik island, was explored, together with the principal creek near its entrance, by the steam cutters of the *Egeria* for a distance of 22 miles following the course of the river, or 9 miles in a direct line from the mouth.

The mangrove swamp extends for 3 miles from the coast, higher up the banks are lined by nipa palms; the river, varying in breadth from 30 to 40 yards and with depths of from 2 to 5 fathoms, makes very sharp bends in places. At 6 miles in a direct line from the entrance the banks on both sides become higher with hard ground, and there are native huts with partially-cleared land in their neighbourhood. The river here begins to wind about considerably, and in several places the depth decreases to one fathom.

At the furthest point reached by the boats the river was about 30 yards wide, but a line of rapids right across barred further progress. Here the water was fresh.

The rate of the current was about half a knot an hour.

Coal Mine reach.—The northern entrance to Coal Mine reach lies between Grassy point, Sibetik island, and Adolphy point, on the north side of the Simatahan river entrance, a little over a mile apart. From Grassy point, the shore of Sibetik island turns sharply to the south-west and forms, with the opposite shore of Traverse island, a channel a little over half a mile wide. At the north-east and south-west ends of the reach, on the Borneo side, are the mouths of the Simatahan and Serudong rivers, respectively. The survey of 1910 was carried as far as the parallel of the boundary beacon on the west side of Sibetik island, and included the two rivers just mentioned.

Shoals.—Pilot bank extends 4 miles east-north-eastward from Adolphy point, north side of Simatahan river entrance; both this

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

bank and that extending from Grassy point are steep-to, the lead giving little warning, especially in the deep water between the two points, where the navigable channel is only half a mile wide.

Llewellyn bank is an extensive mud flat that dries in patches and extends from Agas point nearly across the Simatahan river entrance towards Adolphy point; it is steep-to.

Drake bank, of hard clay, with a least depth of $3\frac{1}{2}$ fathoms, and general depths of 4 to 5 fathoms, lies in mid-channel off the Coal dépôt on Sibetik island.

Directions from Tawao to Sibetik island coal dépôt.—From Tawao anchorage a vessel should steer N. 77° W. for about $9\frac{1}{2}$ miles, passing along the north shore of Sibetik island, westward of Prescott point, at a little over a mile distant, where the depths are from 8 to 9 fathoms. This course leads across the tidal streams, and attention is necessary; the position of the vessel may be readily ascertained by bearings of the numerous hill tops and the near tangents of Sibetik island as it is approached. When Adolphy point, which appears as a somewhat sharp tangent of land, bears S. 80° W., it should be steered for on that bearing, which leads between the dangers on either side. As Grassy point is approached attention is required to the steering, as the tidal streams run here with a velocity of $2\frac{3}{4}$ knots at springs. When Datum point, the extremity of the land on Sibetik island south-westward of Grassy point, is seen open of Grassy point bearing S. 42° W., it should be steered for on that bearing, course being altered quickly as the channel is only half a mile wide, passing 3 cables off the land at Grassy point, after which a mid-channel course should be followed in Coal Mine reach. Vessels waiting to berth should anchor in about 8 fathoms in mid-channel northward of Drake bank. The deepest passage, 2 cables wide, where the depth is $6\frac{1}{4}$ fathoms, lies northward of Drake bank, and the least depth between the bank and the pier is 5 fathoms.

Coaling pier (*Lat. $4^{\circ} 14' N.$, Long. $117^{\circ} 38' E.$*).—The coal dépôt of the Cowie Harbour Coal Company is established at the north-west end of Sibetik island where there is a coaling pier situated about 3 miles south-westward of Grassy point. The pier is 145 feet in length, with a pierhead of 100 feet by 35 feet, and a depth of 5 fathoms at low water springs at the end. All export of coal is done here. Vessels for coal report first at Tawao.

Bollards are placed on the shore, to enable vessels to go and lie alongside the pier.

Water fit for boilers is supplied by a pipe to the pier.

The head offices of the coal mine are situated at Silimpocon, on the Serudong river, about 14 miles from the pier.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

Coal.—From 1,000 to 4,000 tons of native coal are usually available; bunker coal can be put on board at the rate of 15 tons an hour, price \$6.50 per ton. Cargoes of coal can be loaded at the rate of 500 tons per diem; labour is plentiful. There are two 500-ton lighters, which are used to convey coal from Sibetik to Sandakan, and four of 100 tons.

Port charges.—Vessels enter and clear at Tawao. There are no port charges when calling for coal to replenish the bunkers, but otherwise the charges amount to 2 cents per ton register.

Communication.—There is regular monthly steamship communication with Singapore, and weekly with Hong Kong; local steamers call once a fortnight.

Tides and tidal streams.—It is high water, full and change, at Sibetik island coal depôt at 7h.; springs rise $12\frac{1}{2}$ feet, neaps rise 7 feet. The ebb stream commences one hour after high water by the shore and attains a velocity of $2\frac{1}{2}$ knots at springs. The flood stream commences $1\frac{1}{2}$ hours after low water and attains a velocity of $2\frac{3}{4}$ knots at springs.

Coal depôt to the southward.—Opposite the mouth of the Serudong river the shore of Sibetik island turns sharply to the south-east; here shallow flats commence, stretching right across from shore to shore, leaving an intricate narrow channel, with a least depth of 3 fathoms, to the southward, only suitable for small craft. Abreast Sedam island the channel is only $1\frac{1}{2}$ cables wide.

Serudong river (*Lat. $4^{\circ} 14' N.$, Long. $117^{\circ} 36' E.$*).—The Serudong river has its entrance opposite the western extreme of Sibetik island, where it is three-quarters of a mile wide between Doris point on the north and Monk point on the south; thence it trends in a general west-north-west direction for $6\frac{1}{2}$ miles to Merlin point, where the river is only 250 yards across, and beyond which vessels of any size should not proceed; above Merlin point the river is known as the Silimponon. At Dingle point, 2 miles above Merlin point, the river is only 200 yards wide and can only be navigated by launches and lighters. The navigation of the river as far as Merlin point presents no difficulty, and the tidal streams seldom exceed one knot. The general depths are not less than 6 fathoms in mid-channel, except on Entry flat, on which there is not more than 4 fathoms at low water, and on Watson ridge, which has a least depth of $4\frac{1}{2}$ fathoms.

Directions.—When entering the Serudong river, Doris point should be rounded at a distance of 2 cables, to avoid Duke bank; Junction point in line with the tangent of the land forming the north bank of Harvey reach, bearing N. 62° W., leads just northward of

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

Duke bank, and when Doris point comes in line with Agas point a vessel will have passed the extreme of Duke bank, and can alter course to the southward in order to gain a mid-channel course, which should then be followed. The shores are everywhere lined with mangroves, with deep water generally close up to the banks. A moderate sized vessel should not proceed beyond Junction point, where swinging room will be found if moored in 9 fathoms, eastward of the point. H.M.S. *Merlin* lay at single anchor in mid-channel N.W. from Merlin point, where sufficient swinging room was found.

Silimpopon river is the name given to the part of the Serudong river above Merlin point. At Dingle point the river rapidly narrows and is blocked by a flat upon which there is only 6 feet at low water. Painted boards are placed on the banks of the river to facilitate navigation, red marks indicating danger, and white marks that the channel is close to the bank on that side.

About $1\frac{1}{2}$ miles above Dingle point, rising ground commences on the left bank; here is a temporary dépôt known as No. 1, and a halting place for lighters, with a small pier. The coal from the mines is brought by a light railway to No. 2 dépôt, $1\frac{1}{2}$ miles above No. 1, where it is placed in lighters for conveyance to Sibetik coal dépôt. Between Nos. 1 and 2 dépôts, the river is very narrow and tortuous, and can only be ascended by launches at half tide. The tidal limit of the river is situated near the coal mines.

The Silimpopon coal mines, about 3 miles above No. 2. dépôt, are being developed by the Cowie Harbour Coal Company, the output of coal being 100 tons a day (1910).

Simatahan river (*Lat. $4^{\circ} 16' N.$, Long. $117^{\circ} 39' E.$*) discharges opposite Grassy point, Sibetik island, and has its entrance between Agas point on the south and Adolphy point on the north, $1\frac{1}{4}$ miles apart. It trends in a general westerly direction for 7 miles to Caution point at the north end of Trusan Merlin, beyond which it unites with the waters of Kalabakang river. Should a vessel require to proceed up this river, no difficulty will be found in the navigation as far as Rendezvous point, the general depths being from 7 to 10 fathoms in mid-channel, and the tidal streams do not exceed one knot. The shores of the river are everywhere lined with mangroves, with deep water generally close up to the banks.

Llewellyn bank, an extensive mud flat that dries in patches, extends nearly across the river entrance from Agas point towards Adolphy point, and thence to Griffith point, leaving a passage between its northern edge and Adolphy point of only $1\frac{1}{2}$ cables in width and nearly three-quarters of a mile in length.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

An extensive bank lies a short distance south-east of Caution point, and narrows the navigable width of the river considerably.

Directions.—To enter the river a course N. 72° W. should be steered for the extremity of the land on the south bank, half a mile west of Griffith point, in order to pass Adolphy point at a distance of $1\frac{1}{2}$ cables, and which leads midway between the dangers on either side. On approaching Adolphy point attention is required, the eye being the principal guide. The ebb stream at springs sets somewhat sharply round Adolphy point and over Pilot bank, which is steep-to, the lead giving no warning. After passing Adolphy point (*Lat. 4° 16' N., Long. 117° 40' E.*) alter course to the northward as Griffith point is approached, in order to gain a mid-channel course, which should be preserved from here onwards. A vessel of moderate size will find barely sufficient room to swing if moored in the centre of Long Reach, where the river banks are 350 yards apart, in a depth of 10 fathoms. The *Merlin* lay at single anchor in mid-channel, south-east of Caution point.

Trusan Merlin is a narrow serpentine channel, $4\frac{1}{4}$ miles long in a north and south direction, connecting the Simatahan and Serudong rivers. It is only 150 yards across at the narrowest part, and the least depth in mid-channel is $5\frac{1}{2}$ fathoms near the southern end. The turn into Trusan Merlin from the Simatahan river is very sharp, being one of eight points round Caution point, off which there is deep water. If entering the Simatahan from the Trusan, Caution point should be passed within 75 yards as flats extend some distance off-shore on the opposite bank.

If coming from the northward after passing the narrowest part of the Trusan, at Herald point, care should be taken not to mistake a creek for the main channel which lies to the southward of it. A creek near the north end of the Trusan, suitable only for launches, leads about $1\frac{1}{2}$ miles from the entrance to hard ground, which here rises to a height of 1,100 feet, the country everywhere being densely wooded. The navigation of the Trusan Merlin presents no difficulty in a handy vessel, should circumstance require it to be used, but there is scarcely room for vessels to pass if meeting from opposite directions and unprepared.

The velocity of the tidal streams, which enter from both directions, does not exceed one knot an hour.

Boundary beacons.—At $1\frac{6}{10}$ miles south-east from Saima point there is a stone beacon, covered at half tide, on the edge of the mangrove swamp, to mark the exact spot where the parallel of 4° 10' N. cuts the coastline; its position having been determined by joint observations on the part of British and Dutch officers.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

A wooden tripod beacon marks the spot where the boundary parallel meets the south-western shore of the island.

A wooden tripod boundary beacon has also been placed on the mainland at Burs point, whence an imaginary line drawn N. 74° 20' W. (true) marks, in conjunction with the beacons just mentioned, the separation of British and Dutch territory.

East point (*Lat. 4° 8' N., Long. 117° 56' E.*), situated south-eastward $4\frac{1}{2}$ miles from Saima point, is a rounded point with a hard sandy beach, backed by high casuarina trees. From Saima point the mud flats widen outwards, as the coast trends south-eastward towards East point. The sand and mud flats dry off to a distance of $1\frac{1}{2}$ miles eastward of this point, but they are not so soft as the flats of unmixed mud further to the northward.

At $1\frac{1}{2}$ miles northward of East point, and one mile from the coast, there is a sandbank that dries 4 feet; it is separated from the mud flats fronting the shore by a narrow channel.

The 3-fathoms and 5-fathoms lines pass close outside this sandbank, and the edge of the shallow water is very steep to all along the shore from Saima point to abreast of East point, from which these contour lines are distant 2 miles; the depth decreases suddenly from 6 to 2 fathoms.

Stone point.—From East point the coast trends to the southward with a slight indentation for $3\frac{3}{4}$ miles to Stone point; the sandy beach in this bight is backed by red cliffs from 20 to 80 feet high, the country behind is low and densely wooded. Off Stone point there are several patches of rocks that dry at low water, and at $1\frac{1}{2}$ miles to the south-westward of Stone point there is a very small islet close to the coast which from thence trends south-westerly and westerly for $3\frac{1}{4}$ miles to the south point of the island.

Dangers.—Dutch spit.—Eastward of Stone point the 3-fathoms contour line projects in a sharp elbow to a distance of $5\frac{1}{4}$ miles from the coast; from the extremity of this spit, which is known as Dutch spit, Mount Batu Tinagat bears N. 13° W. A detached shoal with $2\frac{3}{4}$ fathoms on it lies $1\frac{1}{2}$ miles north-north-west from the end of the spit. The 5-fathoms line extends $1\frac{1}{4}$ miles eastward of Dutch spit.

Vessels approaching Tawao from the southward should be careful in rounding Dutch spit, especially on the flood tide.

Padang bank, lying 2 miles south-south-east from Stone point, has on it a patch that breaks, with only 3 feet water over it.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

Mangkassar banks, portions of which dry at low water, are two banks lying east and west of each other, situated south-south-eastward of Stone point, and are together nearly 3 miles in length within the depth of one fathom; they are narrow, and steep to on both the north and south sides. The western edge has not been defined; the eastern end of the bank in a depth of 3 fathoms lies about $4\frac{1}{2}$ miles south-eastward of Stone point, and from it Mount Batu Tinagat bears N. $\frac{1}{2}$ W. A ridge, with depths of less than 5 fathoms on it, extends $3\frac{1}{2}$ miles eastward from the shoal extremity of these banks.

The channel between Mangkassar and Padang banks has a depth of 5 to 7 fathoms in it, but in view of the survey having terminated short of its western end it would be imprudent to attempt to pass through it.

Unarang rock is a small rocky patch that dries one foot at low water springs, with 9 to 20 fathoms close around. It is situated 10 miles E. by S. $\frac{1}{2}$ S. from Stone point, Sibetik island, just outside the edge of the 20-fathoms contour line, with Mount Batu Tinagat bearing N. 25° W., and forms the southernmost outer danger in the approach to Tawao. The main entrance to the strait north of Sibetik island lies between Unarang rock and Hand rock, $9\frac{1}{2}$ miles to the north-east.

Charts 2099, 2576.

SIBUKO RIVER.—From Tanjong Ahus, or Keerweer point (Lat. 3° 48' N., Long. 117° 50' E.), the eastern extreme of Ahus island, the coast trends north-westward for 26 miles to the mouth of the Sibuko river, and is formed by three islands. From Tanjong Ahus, shoal banks extend eastward about 9 miles. The approach to the entrance of the Sibuko river from sea lies between the three islands mentioned, on the south, and East Nonokong island on the north, and is from 2 to 5 miles wide between the banks. On the outer bar, northward of Ahus island the depth is 5 fathoms in the centre, increasing to 6 fathoms within until about 5 miles distant from the mouth of Sibuko river, when it decreases to 5 fathoms in mid-channel.

Chart 2099, N.W. part of Sibuko bay.

In the Sibuko river entrance is Senelak island, 344 feet high near the south end; banks, dry at low water, extend a quarter of a mile south-west and westward from the island; Tembalan off its south point and Pelanduk near the north entrance point of the river are wooded rocks. The channel southward of Senelak appears to be deep, while that to the northward has $3\frac{1}{2}$ fathoms in it; at three-quarters of a mile within the island the depth is $4\frac{1}{2}$ fathoms in mid-channel. The Sibuko is stated to have a bore at the time of full moon; the advance of the wave up the river can be heard at some distance.

General charts 2576, 2660b, 1263.

Chart 2099, N.W. part of Sibuko bay. Var. 2° 20' E.

The land on either side of the river mouth is high and rocky, but 5 miles upwards the shore is again low and covered with mangroves. The river has been ascended for 25 miles with depths of 3 to 7 fathoms, and gradually narrows to about 300 yards amidst dense forests.

Sibakies and Simengaris rivers, two streams northward of the Sibuko, unite in a common mouth, 2 miles wide, at Bakies point, 4 miles westward of Sibuko river entrance. The Sibakies river has $2\frac{1}{4}$ fathoms outside the entrance and from 3 to 8 fathoms for 6 miles up; the Simengaris has from $1\frac{1}{2}$ to 2 fathoms at the entrance, and carries from 2 to 12 fathoms for 9 miles.

Coast.—From the point opposite Sibuko river entrance the coast trends north-eastward for about 6 miles to the southern branch of the Sino Solan river, which is separated from the northern branch by an island, the eastern point of which is Burs point, with a boundary beacon on it, previously mentioned. These two branches unite about $4\frac{1}{2}$ miles from their entrances, and are afterwards connected with the Serudong river, as charted. Separated from this coast by a channel one-third of a mile wide, with a depth of one fathom in its north entrance, named Leigh strait or Trusan Tina Basan, is Tina Basan island, $3\frac{3}{4}$ miles long north-east and south-west and 2 miles broad.

East Nonokong island or Nunukan (*Lat. $4^{\circ} 4'$ N., Long. $117^{\circ} 40'$ E.*), situated eastward of the Sibuko river entrance and south-west of Sibetik island, is 11 miles in length north and south and $9\frac{1}{2}$ miles broad, high and densely wooded. Between it and Tina Basan on the north-west is a channel 2 miles wide in which the depth is 2 fathoms at the south-west end; close to the north-western coast of the island, opposite Burs point, are a sunken rock and two others awash. The channel between East Nonokong and Sibetik island is from $1\frac{1}{2}$ to 2 miles wide, with depths of from $4\frac{1}{2}$ to 10 fathoms.

Between the east and south points of East Nonokong island, a shoal spit with less than 3 fathoms at the end, extends $9\frac{1}{2}$ miles from the shore in an east-south-east direction; the inner part of this spit dries at low water to a distance of 6 miles eastward from the south point of the island.

The chart should be used with caution when in the vicinity of East Nonokong island, and the approach to the Sibuko river.

The coast of Borneo, southward of lat. 4° N., is described in Eastern Archipelago, Part II.

Chart 2576, Sulu archipelago, &c.

Off-lying dangers.—Doubtful rock.—A sunken rock with no soundings around it is marked "D" on the chart, $19\frac{1}{2}$ miles

General charts 2576, 2660b, 1263.

Chart 2576, Sulu archipelago, &c. Var. 2° 20' E.

S.E. $\frac{3}{4}$ E. from Stone point, Sibetik island, in lat. $3^{\circ} 52' N.$,
long. $118^{\circ} 11' E.$

Chart 3577, Sesajap and Bulungan rivers.

Banda reef (*Lat. $3^{\circ} 50' N.$, Long. $118^{\circ} 1' E.$*) is a coral reef with
a depth of 6 feet over it, situated $10\frac{1}{2}$ miles E. by N. $\frac{1}{4}$ N. from Tanjong
Ahus.

General charts 2576, 2660b, 1263.

CHAPTER IV.

SOUTH-WESTERN EXTREME OF MINDANAO ISLAND, BASILAN STRAIT
AND SULU ARCHIPELAGO.

VARIATION IN 1911.
Slightly increasing.

Chart 961, Basilan strait.

S.W. end of Mindanao.—Caldera bay and port lie to the eastward of the sandy point of that name on the south coast of Mindanao. There is anchorage in the bay in a depth of 6 to 8 fathoms, sand. The inner port of Caldera can only hold four or five vessels of 6 feet draught; the entrance channel to it is but 70 yards wide and 12 feet in depth.

A supply of coal belonging to the Insular Government is kept here; it is in charge of the Collector of customs, Samboanga.

Coast.—From Caldera point the coast runs 7 miles east-south-eastward to the town of Samboanga; it consists of sand beaches with some rocky bluffs, and is steep, low, and wooded. Vessels can anchor if necessary in front of the town of San Mateo, 4 miles eastward of Caldera point, on a bank of sand, in a depth of 8 to 15 fathoms; but elsewhere along this part of the coast the bottom is foul and uneven.

SAMBOANGA (*Lat. 6° 54' N., Long. 122° 5' E.*), the principal town of Mindanao, situated on the south-west extreme of the island, is a small town of growing importance. It contains a cathedral, fort, and public hospital; the population in 1903 amounted to 20,692. The settlement dates from the year 1635, when the necessity was recognised of establishing a military post in the centre of the hostile district, as a base of operations against the Moros and pirates.

There are two piers at Samboanga, one of which is marked on the chart, the other being situated about a quarter of a mile to the eastward. The one charted has been extended a distance of 2 cables and an arm built out from the end in an easterly direction; it is alongside this arm that small steam vessels secure, and can procure fresh water. The depth is about 18 feet at the end of the pier. Samboanga is a port of entry for foreign trade and a telegraph station.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

LIGHT.—A *red fixed* light, visible 10 miles in clear weather, is exhibited, at an elevation of 36 feet above high water, between two iron supports with iron cabin at base, situated at the outer end of the Government pier at Samboanga. The light has been reported to be visible only $2\frac{1}{2}$ miles. A *green* light is shown from the pier to the eastward of the Government pier.

Anchorage.—The anchorage is not good; the narrow bank that forms it is very steep, and, outside a depth of 12 fathoms the bottom is hard and uneven, and many ships have lost their anchors there. Vessels anchor anywhere in front of the town, not going inside of 10 fathoms, as the water shoals rapidly. A good berth is in 10 fathoms, with the lighthouse N. by W., and the south-west extremity of Tiktauan island in line with Mariki point S. 73° E.

Vessels intending to remain at Samboanga more than 24 hours should moor, as it is almost impossible to keep a clear anchor owing to the strong tide and frequent calms. It is advisable to run the cable out with the head in-shore, letting go the second anchor in 7 fathoms; under these directions the vessel would not ground, or, even if she swung stern in, be endangered, as the currents and eddies have an off-shore set, and in weighing the in-shore anchor, which should be first lifted, the current will only cause the vessel to ride along-shore.

This road is very much exposed to the gales from west and south-west, which, however, are of rare occurrence except during the period of the south-west monsoon; a heavy sea sets in with these gales, and is increased when the flood stream makes against the wind. Four ships at one time were totally wrecked by a sudden and heavy south-west gale at this anchorage, the cables having either parted or the anchors dragged.

On the first appearance of a south-westerly gale sailing vessels now slip from Samboanga, and if possible run inside Tiktauan island, to the anchorage in Port Masinglok (*Lat. $6^{\circ} 55' N.$, Long. $122^{\circ} 10' E.$*), which is in 8 to 12 fathoms, mud, and affords good holding ground. The approach of these storms is generally foretold by the coast of Basilan being hidden by masses of flying clouds, and the Sangboy islands being lost to view; and if at the same time it should be cloudy, dark, and threatening to the north-west, bad weather is certain, the wind beginning generally to blow from the north-west, and backing until it settles from the south-west. The cause appears to be a typhoon passing to the northward.

During the north-east monsoon the road is sheltered and the water smooth.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

Supplies.—Provisions can be obtained at Samboanga at a moderate price; it is necessary to order them the day before to ensure the supply. Meat and poultry, especially, are cheap.

The cost of provisions, all of good quality, is:—beef, 6·75d. per pound; vegetables, 2·16d. per pound; bread, 2·7d. per pound.

The water supply of the town is obtained from plant, capable of distilling 3,000 gallons per diem, from which water is laid on to the western pier, where it can be obtained, free of charge, by vessels going alongside. There is also a private firm (Messrs. Wilson) who own a plant capable of distilling 500 gallons per diem. Both plants have refrigerators attached.

Water from the stream that runs through the town is impure, and is only used for washing purposes, as during the day the natives wash themselves and their clothes throughout its course several miles inland. The principal medical officer at Samboanga considers the stream water most dangerous, even with the precautions taken of obtaining it early in the morning, and of filtering.

Coal.—There is no private supply. The U.S. Government keep about 1,000 tons in stock.

Communication.—China Steam Navigation Company (British) steamers call on their way from Hong Kong to Australia—one steamer a month each way (*i.e.*, two per month). North German Lloyd and Hamburg Amerika lines each send one steamer a month from Singapore.

Compañía Marítima (U.S. mail contract) call fortnightly, keeping touch with the Philippine islands coasts.

Large steam launches run frequently to Sandakan *via* Sulu archipelago.

Dry dock (*Lat. 6° 54' N., Long. 122° 5' E.*).—Just inside the mouth of the Honda river, which discharges about 3½ cables eastward from the fort at Samboanga, there is a small dry dock; *see* Appendix II. The entrance to the river is shoal, and vessels of the above draught can only approach the dock at high water.

Telegraphs.—There is a wireless telegraph station at Samboanga; call letters **F M.** The skeleton steel erection is a conspicuous mark from the sea, standing 2½ miles west-north-westward from the fort.

Samboanga is connected with the general telegraphic system of the Philippine islands as follows:—

To Sulu, and thence to Siassi on the south by cable.

To Negros by way of Camp Overton (Mindanao) and thence by cable to Dumaguete (Negros) and so on to Panay and Manila, &c.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

By sea to Malabang, and the remainder of Mindanao by land lines, which will eventually end at the north-east point of Surigao, where the cable crosses to Leite island. *See page 4.*

Tides.—At Samboanga there are generally two tides in the lunar day; but at equinoctial quarterings, and when the moon has high declination, there is but one tide. The time of high water at full and change is 7h. 8m., and springs rise $4\frac{3}{4}$ feet. The same phenomenon is observed here as in the China sea, viz., the highest tide follows the moon's superior transit when she has southern declination, and the inferior transit when she has northern declination. *See page 715.*

Winds.—In the vicinity of Samboanga the winds which prevail during the different months of the year are: In January, from east and north-east, with clear weather; in February, March, and April, the same winds with occasional breezes of short duration from the north-west. In May and June it blows from the south-east, and is variable; but in June there are squalls, and at the end of the month fresh breezes from the south-west. In July, August, and September it blows from the south-west with more or less force, and much rain and foul weather; when a gale occurs it generally does not last more than three or four days. In November and December it blows from the north and north-east, and then the monsoon becomes steady.

Throughout the year, when the seasonal wind is not strong, the land breeze blows during the night, sometimes freshly.

COAST.—From Samboanga the coast runs $2\frac{1}{2}$ miles east-south-east to Mariki point (*Lat. 6° 53' N., Long. 122° 7' E.*), and thence east-north-eastward towards Port Masinglok, and is low and fringed with mangroves; depths of 4 fathoms extend half a mile south-east from Mariki point.

Tiktauan island, $2\frac{1}{4}$ miles in length, east-north-east and west-south-west and three-quarters of a mile broad, is low and wooded. A reef, with depths less than 4 fathoms, extends one-third of a mile south-westward and southward from the island; to the north-eastward, shallow water with less than 2 fathoms extends half a mile, continuing, with depths less than 5 fathoms, to the distance of $1\frac{3}{4}$ miles in that direction. Tiktauan lies $1\frac{4}{10}$ miles eastward from Mariki point and is separated from the coast by a channel half a mile wide and 10 to 14 fathoms deep, affording good anchorage. A reef of sand and coral 4 cables in length and 50 yards wide, with a depth of $3\frac{1}{4}$ fathoms, extends in a north-west direction from about the centre part of the north side of Tiktauan, towards the middle of the channel, and is generally marked by tide rips. The south-western point of the island bearing S.S.W. $\frac{3}{4}$ W. leads westward, and the northern tangent of the island bearing E. $\frac{1}{4}$ N. leads northward of the reef.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

Northward of Tiktauan channel, at about 4 miles eastward of Mariki point, a narrow inlet runs up $2\frac{1}{2}$ miles to the westward with several rivers flowing into it. The island Vilanvilan divides this inlet into two arms, the southernmost of which, $3\frac{3}{4}$ fathoms in depth, is navigable.

Sakol islands are a group of islands lying north-eastward of Tiktauan, from which they are separated by a navigable channel. They are fringed with mangroves and surrounded by narrow coral reefs, and have no navigable channels between them. Panhapuyan island, the south-western of the group, has foul ground extending south-westward from it for about 4 cables.

Sakol island, the largest of the group, is separated from Mindanao by a navigable channel. It is about 5 miles long in a north-east and opposite direction, is low in the north-western part, but the north-eastern part rises to three hills from 739 to 781 feet in height. The middle elevation is known as Sakol hill or South mount (*Lat. 6° 58' N., Long. 122° 16' E.*).

A coral shoal, with a depth of half a fathom, lies three-quarters of a mile off the north coast of Sakol island, with the west tangent of that island bearing S. 42° W. and the north-east point S. 83° E., and a patch of $1\frac{1}{2}$ fathoms lies 4 cables eastward of it, towards the north-east point of the island.

Port Masinglok is the name given to the channel between Mindanao and Sakol islands. From the entrance to the Tiktauan channel, which may be considered a prolongation of Port Masinglok, it is about $8\frac{1}{2}$ miles to the shoals obstructing the north end of the passage. It is over half a mile wide and 8 to 14 fathoms deep. Good anchorage may be found anywhere in this strait in from 6 to 12 fathoms, completely sheltered from wind and sea, and vessels take refuge here during the south-west monsoon.

In the northern entrance to Port Masinglok there are a number of shoals which divide it into two channels, both of which are about half a mile wide. The northern channel has a least depth of $5\frac{1}{2}$ fathoms, and the southern a least depth of $6\frac{1}{2}$ fathoms.

Tidal streams.—The flood stream sets south-westward and the ebb to the north-east at the same hours as at Samboanga.

Chart 2576, Sulu archipelago, &c.

Roldan rock, lying 2 miles north-north-east of the north-east point of Sakol, is small, with a least depth of three-quarters of a fathom and deep water around it.

Chart 961, Basilan strait.

Tulnalutan is a small island 269 feet in height, and less than a mile in extent, lying $3\frac{1}{2}$ miles eastward of the east end of Sakol.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

Sinonog is a small, low island lying $2\frac{1}{2}$ miles eastward of the south-east part of Sakol, and $1\frac{1}{2}$ miles south-westward of Tulnalutan. It is surrounded by a reef which extends a third of a mile east-north-east, with depths of 9 to 17 fathoms at the edge.

A shoal, with a depth of $4\frac{1}{2}$ fathoms over it, sand bottom, lies about $1\frac{1}{2}$ miles S. 78° E. from the centre of Sinonog island.

Samar or Angosto rock, situated E. by N. $\frac{3}{8}$ N. about 4 miles from the peak of Tulnalutan, of sand and coral, is one-third of a mile in diameter, with $1\frac{1}{2}$ fathoms least water on it. From the shoal the highest hill on Sakol and the north end of Tulnalutan island are in line, and Matanal point, Basilan island is in line with the western end of Lanhil island.

BASILAN STRAIT, open from west to east, separates the south coast of Mindanao from Basilan island; it is $8\frac{1}{2}$ miles wide and 24 miles in length. The Santa Cruz islands and banks, situated on the Mindanao side, divide it into two deep channels, both equally navigable; the northern channel, although the narrowest, is generally preferred by sailing vessels, as it offers the advantage of anchorage on the coast of Mindanao in the event of a calm, thus avoiding being carried away by the current.

Islands and dangers in the strait.—Santa Cruz bank and islands.—This coral bank, the northern edge of which is distant $1\frac{1}{2}$ miles from the coast of Mindanao, extends 8 miles in a direction parallel to the coast with a general width of 2 miles. The shoalest water, one foot to 4 fathoms, is distributed in patches along the outline, leaving passages to the interior of the bank, the depth over which ranges from 6 to 12 fathoms. There is a channel with not less than 8 fathoms, crossing the middle of the bank diagonally, in a north-west and south-east direction.

Santa Cruz or Great island, on the eastern part of the bank, is nearly $1\frac{1}{2}$ miles in length, and 9 cables in maximum width; it is low, flat, wooded, and surrounded by a narrow reef with 6 to 8 fathoms water at the edge.

Little Santa Cruz island, also low, flat, and wooded, lies on the northern edge of the bank, north-west of the larger island. It is 8 cables in length east and west, and $1\frac{1}{2}$ cables wide, and each end is prolonged by a reef, which dries at low water springs to the distance of half a mile; shoal water of 2 fathoms extends from the western reef to a distance of $1\frac{1}{2}$ miles from the island.

LIGHT (Lat. $6^{\circ} 53' N.$, Long. $122^{\circ} 2' E.$).—A light *white occulting every ten seconds*, with an eclipse of *three seconds*, is shown at an elevation of 64 feet above high water, from a white framework structure, 53 feet high, situated on the summit of Little Santa Cruz; it is

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

visible in clear weather from a distance of 12 miles from all directions, except when obscured by Great island. See Light list and chart.

The Great bank extends to $4\frac{1}{2}$ miles west-north-westward of Great island, but the most dangerous part is about $2\frac{1}{4}$ miles westward of the west extreme of the island, where there is less than 2 feet water, on a continuation of a line from half way between the fort and cemetery of Samboanga to the eastern end of the small island. Two shoals of 2 and $2\frac{1}{2}$ fathoms lie respectively North and N.E. $\frac{1}{2}$ N. about three-quarters of a mile from the eastern point of Great island. President shoal, with depths of $2\frac{1}{2}$ to $3\frac{3}{4}$ fathoms, extends from three-quarters of a mile south-west to nearly one mile south-eastward of the point; a detached patch of $4\frac{3}{4}$ fathoms lies $1\frac{1}{2}$ miles east-south-eastward from the same point.

Clearing marks.—The red light on the Samboanga pier bearing N.W. by N. leads eastward of the $4\frac{3}{4}$ -fathoms patch, in 7 to 8 fathoms, and the light bearing E. $\frac{1}{4}$ S. leads northward of the western part of the bank. Caldera point, bearing N. by W., leads westward of Great bank in 9 fathoms. The northern side of Little Santa Cruz island bearing W. by N. leads northward of the patches north-east of Great island.

Malanipa island, $1\frac{3}{4}$ miles in length and 394 feet high, situated $3\frac{1}{2}$ miles south of the east part of Sakol, lies on the northern side of the eastern entry of Basilan strait, and has on its eastern coast and near the south end a small islet named Little Malanipa, surrounded by a reef.

From the west side of Malanipa a bank of fine sand, named the Great sandbank, covered by depths of $1\frac{1}{2}$ to 9 fathoms, extends $4\frac{3}{4}$ miles to the westward, and is generally about half a mile in width; its north-west end, in $5\frac{1}{2}$ fathoms, lies $1\frac{3}{4}$ miles east-south-east from the east end of Tiktauan island.

Detached shoals.—A shoal, with a depth of less than 4 fathoms, was reported, 1899, to exist near the middle of Basilan strait, with the east point of Santa Cruz island bearing N. by E., distant $3\frac{1}{4}$ miles.

Luzon reef (Lat. $6^{\circ} 47'$ N., Long. $122^{\circ} 4'$ E.), with a depth of $3\frac{3}{4}$ fathoms, lies on the south side of the strait, $4\frac{3}{4}$ miles S. 1° W. from the east point of Great island, and 2 miles from Basilan island.

A shoal of $3\frac{1}{2}$ fathoms lies about one mile south-south-eastward of Luzon reef.

Tidal streams.—In Basilan strait the tidal streams follow the direction of the channel, and near the islands and shoals they follow the edge of the reefs; the flood stream setting to the westward and the ebb to the eastward, with a velocity of 2 to 3 knots at neaps, and 5 to

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

6 knots at springs. The streams have been observed, however, to set in the reverse way in the months of November and December, and sometimes to set in the same direction for 24 hours, generally from west to east, although there have been two high tides and two low tides on the same day. With these exceptional cases the turn of the stream at Samboanga takes place with slight differences at the hours of high and low water.

The turn of the tide takes place later in the strait than at Samboanga. The change begins first on the coast of Mindanao, then in the strait, and finally on the coast of Basilan.

Coco island, situated $4\frac{1}{4}$ miles from the north-east coast of Basilan, is nearly one mile long north-west and south-east, 489 feet high, and wooded; the shore reef surrounding it to the distance of about one cable is steep-to. A small islet, named Little Coco, round topped and covered with vegetation, lies about 3 cables north-west of it, with a navigable channel $1\frac{1}{2}$ cables wide between, in which the depths are from 6 to 11 fathoms.

Sibago island, $7\frac{1}{2}$ miles eastward of Coco island, and about the same distance from Matanal point, the north-east point of Basilan island, is $1\frac{1}{4}$ miles in length north-west and south-east, and two-thirds of a mile in width, and covered with vegetation; it contains two distinct and prominent hills, the north-eastern of which is 735 feet and the southern 686 feet in height, but the coast is low. A bank of sand and rock extends for nearly half a mile south-eastward from the island, with depths of 4 to 10 fathoms on it; beyond this the water deepens quickly.

Lanhil island (*Lat. 6° 46' N., Long. 122° 22' E.*), $1\frac{1}{2}$ miles north-west of Sibago, is $1\frac{1}{4}$ miles in length east-north-east and west-south-west, and 558 feet in height, near the southern end, and wooded; it has a low shore terminating to the eastward in a reef which dries out for about a quarter of a mile. Sibago and Lanhil islands seen in certain directions appear as one, saddle-shaped; there are no out-lying dangers, and the channel that separates them is clear, with a depth of 17 fathoms.

Chart 928, Sulu archipelago.

THE SULU ARCHIPELAGO consists of a long chain of islands extending more than 180 miles from the south-west end of Mindanao, to Sibutu passage, off the north-eastern extremity of Borneo, and includes over 300 islands of various sizes. It is divided into three principal groups:—that of Basilan to the eastward; Sulu, from which the name is derived, in the centre; and Tawi Tawi to the

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

westward. Besides these, there are smaller groups, the description of which is included in that of the three larger groups. *See* page 7.

BASILAN GROUP.—Basilan island (*Lat. 6° 35' N., Long. 122° 0' E.*), which, with the south-west end of Mindanao, forms the strait of Basilan, is the largest and principal of the group; it is 32 miles in length east and west, and 20 miles in breadth. The island is thickly wooded, and is traversed by high mountain ranges which are frequently enveloped in clouds. The highest peak, lying somewhat to the southward of the centre, attains a height of 3,346 feet. The shores of the island, which are low and wooded on nearly all sides, are girt by a belt of sand and coral debris from 50 to 100 yards wide. This belt is sometimes covered at high tides, and forms mangrove swamps. *See* view *c*, at page 222.

There are many rivers, but they are of small extent; their mouths are wide and can be entered by boats at high water, but a short distance up the width contracts until the river becomes a mere rivulet, flowing among stones. Good watering places do not exist, as fallen trees intercept the passage of boats.

Navigation round the island presents no difficulties: the water is clear, and the bottom can be seen at a depth of 8 to 10 fathoms; as the weather is generally fine, vessels can anchor anywhere round the coast on coral bottom.

The inhabitants of Basilan, a scanty population, are of the same race, and speak the same language as the other inhabitants of the Sulu islands; that is a language partaking more of the Philippine than the Malay character, and much intermixed with the Bisaya, one of the most prevailing languages of the Philippine archipelago.

Chart 961, Basilan strait.

LA ISABELA is a port on the north-west side of Basilan island, facing Isabela channel, which separates Malamaui island and the main island, and formerly was a Spanish naval station. La Isabela is a telegraph station.

Malamaui island, situated off the north-west coast of Basilan, is 538 feet high, and thickly wooded. The timber is considered to be superior to any found in the neighbourhood, and is well adapted for spars and for building; it consists of molavi, poon, palo maria or bitanhal, and mangrove.

Lampinigan.—Beacon.—Lampinigan, about half a mile long, east and west, is about 200 feet high. It lies $3\frac{1}{2}$ miles west-south-west of Malamaui, about a mile off-shore, and has an iron tripod beacon, 35 feet high, on the summit near the west end.

General charts 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

Moro island, or Panusuhan, is low, but covered with trees whose tops are 50 feet above the water and visible at a distance of 7 miles.

Dangers.—Pamelukan bank (*Lat. 6° 43' N., Long. 121° 54' E.*).—Pamelukan bank lies 2 miles westward of Malamaui, and $2\frac{1}{2}$ miles N.E. of the summit of Lampinigan. Within the 5-fathoms limit it is about 4 cables in length, north-east and south-west, with a rock on the south-eastern side, on which the depth is 5 feet; the remainder of the bank has depths of 8 to 17 fathoms.

A bank lying north-westward of Lampinigan stretches east and west for 4 miles, and has two patches of 4 and $4\frac{1}{2}$ fathoms on it, situated respectively N.W. by W. $\frac{1}{4}$ W. nearly 2 miles and N. by W. $\frac{1}{2}$ W. $1\frac{3}{4}$ miles from the summit of Lampinigan. There are besides these, several banks to the north-west of Malamaui, on which the least depths ascertained are 7 to 8 fathoms.

Reef.—At $1\frac{1}{2}$ cables east-south-east of Moro island there is an extensive reef awash, nearly always covered by driftwood, and marked by the ripple round its edges; part of the sand is always above water, and some mangrove bushes grow there. The depth of water off the eastern edge of this bank is decreasing towards the Basilan coast.

At $1\frac{1}{2}$ cables westward of Moro island there is a small shoal covered by $2\frac{1}{4}$ fathoms.

Anchorage.—Malamaui road, to the south-westward of the island of that name, is a safe anchorage for all classes of vessels; the holding ground is good and strong winds uncommon.

The best anchorage is off San Rafael bay in 12 to 15 fathoms, mud bottom, nearly $1\frac{1}{4}$ miles from the shore; small vessels may lie nearer the shore, in 4 to 5 fathoms, close eastward of Matanaye island.

Directions.—In approaching Malamaui road from the northward, Pamelukan bank and rock are the only dangers. In making for the anchorage steer for Lampinigan island, passing westward of Pamelukan bank if approaching from the northward, or passing between Basilan island and the 4-fathoms patch northward of it when entering from the westward. In daylight, vessels can pass eastward of Pamelukan bank.

Isabela channel can be entered from the north or south, and there is sufficient depth of water for large vessels. The channel is 4 miles long, and has an average width of $1\frac{1}{2}$ cables, with a depth of 6 fathoms. The mangroves on each side grow to the water's edge. Vessels generally take the entrance which will bring the tide against them in order to avoid turning in the channel.

General charts 928, 2576, 943, 1263.

Chart 961, Basilan strait. Var. 1° 30' E.

In entering the channel from the northward the only precaution necessary is to avoid a shoal at the entrance covered by 2 feet water, lying $2\frac{1}{2}$ cables from the Basilan shore, by rounding the east point of Malamaui island at the distance of $2\frac{1}{2}$ cables. Inside the channel the chart shows a shoal of $2\frac{3}{4}$ fathoms at one cable from the Basilan shore; a rock with 2 fathoms on it near Kalut island; another shoal with one fathom on it at the entrance of a creek on the Basilan shore, half a mile from Kalut; and near the middle of the channel on the Basilan side, a shallow shelf of coral, extending one cable from the shore, about 6 cables N.E. of the entrance of the River Pasahan; but nearly everywhere, after passing Kalut island, the Malamaui shore can be passed at a distance of three-quarters of a cable. The bottom in Isabela channel is rocky and the anchorage bad.

Western entrance.—Vessels should always enter Isabela channel from Malamaui road against the tide; the deepest channel is northward of Moro island, passing between the shoal water extending nearly a quarter of a mile south-west from Malamaui island, and the $2\frac{1}{4}$ -fathoms patch, and avoiding the reef off the north-east point of Moro island as the tide sets towards it.

There is a channel on either side of the reef previously mentioned, but care is required as there is a considerable cross current.

The naval establishment (*Lat. 6° 42' N., Long. 121° 58' E.*) of Isabela is on the south side of the channel at the entrance of the River Pasahan; a fort elevated 65 feet above the sea, commanding both entrances of the channel, stands a little distance southward. There are barracks, a small store and repairing yard, with workshops for machinery, and a slipway for hauling up small vessels. A wooden hospital stands on piles over the reef at the entrance of Pasahan river.

Coal.—There are coal sheds capable of storing 4,000 tons on the island of Malamaui, opposite the naval establishment, but the supply is uncertain. Coal is taken in from a wooden jetty, alongside which vessels of 20 feet draught can lie, though it is not strong enough for vessels to make fast to; they must therefore anchor in the stream and breast in by lines; the jetty is in a little bight of the shore out of the force of the tide. There are anchors securely fixed on shore for bow and stern moorings, the shackles being uncovered at half tide (rocks near the anchors being whitewashed); and there are piles for breast fastenings. It is better to lay alongside with head to the south-westward, as the stern mooring then will lead more nearly fore and aft. Coal can only be obtained by permission of officer commanding at Samboanga.

General charts 928, 2576, 943, 1263

Chart 961, Basilan strait. Var. 1° 30' E.

There is a submerged rock, with 6 feet water on it, about 70 yards south-westward of the end of the wharf.

Supplies.—There are numerous villages along the shore, especially near the rivers, but provisions are scarce; poultry and eggs may sometimes be obtained at Panagahan.

The natives are generally peaceful, although not to be trusted.

Water may be obtained from a hydrant at the settlement, or from any of the rivers; if in the outer road it is more convenient to procure it from the River Gumalarang in San Rafael bay, on the south shore.

Tides and tidal streams.—It is high water, full and change, at 8h. 9m.; springs rise $2\frac{3}{4}$ feet. In the port of La Isabela the tides are very irregular, and a single tide a day occurs more often than two tides. The tidal stream does not turn at high and low water; the flood sets to the south-west, and the ebb to the north-east; the rate is generally from $1\frac{1}{2}$ to 2 knots, but is said to have a maximum of about $4\frac{1}{2}$ knots on the ebb and $3\frac{1}{2}$ knots on the flood. See Appendix, page 719.

Tidal signals.—The following tidal signals are shown from 6 a.m. to 6 p.m. from a flagstaff at La Isabela, and can be seen from either entrance:—

Red cone, point up, at masthead	-	-	High water slack.
„ point down, „	-	-	Low water slack.
Black cone, point up, „	-	-	Strong ebb.
„ „ half-mast	-	-	Ebb.
„ point down, at masthead	-	-	Strong flood.
„ „ half-mast	-	-	Flood.

COAST.—The west and south coasts of Basilan are high, wooded, and steep-to, and can be navigated at a distance of one mile with the help of the chart.

Plan 927, Malusa bay.

On the western side of the island, near Pangasahan point, there is a small islet separated from the coast by a channel $1\frac{1}{2}$ cables wide, and 6 fathoms deep, into which small craft can enter.

Malusa bay (*Lat. 6° 33' N., Long. 121° 51' E.*).—This anchorage, with depths of from 6 to 18 fathoms, on the west side of Basilan island, is protected by two islands: Great Govenen, conical in shape, and 308 feet high, and Little Govenen, also conical, and 59 feet in height. A small shoal of $3\frac{3}{4}$ fathoms lies north-north-east, distant one cable from Great Govenen, and the depths are generally much less than the chart shows in this direction. Good anchorage, in about 6 fathoms, will be found with the northern point of Goreno

General charts 928, 2576, 943, 1263.

Plan 927, Malusa bay. Var. 1° 30' E.

island bearing W. by S. $\frac{1}{2}$ S., and the peak of Great Govenen from S. $\frac{1}{4}$ E. to S. by E. $\frac{1}{2}$ E. Malusa river, the bar of which dries at low water, enters at the head of the bay, but within the bar the depth is 9 feet, and the river is just wide enough for a boat to pull up. The bay (*Lat. 6° 33' N., Long. 121° 51' E.*) in the vicinity of the Malusa river is reported to be shoaling.

ISLANDS WEST of MALUSA BAY.—Teingolan, Taikéla, Dauan, and the two Langasmate islands are flat and covered by vegetation; the channels between them are clear, except that between Teingolan and Taikéla, where there is a coral shoal of $2\frac{3}{4}$ to $3\frac{1}{4}$ fathoms, which leaves a channel 7 cables in width between the shoal and Taikéla. The chart shows two small shoals of one and $1\frac{1}{2}$ fathoms lying one cable off the north end of Taikéla. The small, low, wooded island Teinga Laguit lies $1\frac{1}{2}$ miles north-westward of Teingolan; a reef projects 6 cables northward from it. Odel island, also small, low, and wooded, lies 3 miles westward of the north end of Taikéla.

Teipono, lying $1\frac{3}{4}$ miles south-west of Great Govenen, is a low, wooded island about half a mile in length; a coral reef with a depth of $1\frac{1}{2}$ fathoms extends one cable from its south point.

Northward, two-thirds of a mile from Teipono, there is Gorenno island, small, low, and wooded; the chart shows a coral reef projecting to one cable from its northern end, and a detached patch of one fathom at the distance of a cable from its eastern side. The channel between these islands is deep and clear.

Tides and tidal streams.—The maximum rise of tide is 5 feet; the tidal stream in the channel between the coast of Basilan and the islands Teinga Laguit and Teingolan attains a rate of 3 knots an hour at times; the flood stream sets north-westward, and the ebb to the south-east.

Chart 928, Sulu archipelago.

SOUTH COAST of BASILAN.—Lahat Lahat and other small islets border the coast between Malusa bay and Mangal point, the southern extremity of Basilan. Mangal point is low and sandy; Tumajubun point, 6 miles eastward, has a small hill on it. At the distance of one mile south-east of Tumajubun point is the eastern edge of a shoal with one to 4 fathoms on it, and no bottom with 60 fathoms at less than a cable from it, which extends about 2 miles eastward from Bihintinusa islet. Kaulungan (Kauluan) island, off the south-east point of Basilan, is low; it is separated from Basilan by a narrow channel with several small shoals at its northern end. The soundings on its south-east side are very deep, there being upwards of 60 fathoms at the distance of $1\frac{1}{2}$ cables.

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Matanal point (Lat. $6^{\circ} 37' N.$, Long. $122^{\circ} 19' E.$).—In the large bay between Kaulungan island and Matanal point, the eastern point of Basilan, the depths decrease from 20 to 10 fathoms towards the shore; the bottom is coarse sand and rotten coral, favourable for anchoring upon to wait a tide. The land above the point rises to Mount Matanal, elevated 2,126 feet above the sea.

The north-east shore is low-lying. Coco, Sibago, and Lanhil islands, lying off it, are described with Basilan strait. See page 246.

SANGBOY GROUP.—Teinga island, the northernmost of the archipelago, is small, low, and wooded, and is fringed by a reef. The bank, with depths of 5 to 11 fathoms, on which the group is situated, extends to a distance of about 5 miles east-north-east of Teinga. A patch of $3\frac{3}{4}$ fathoms lies three-quarters of a mile eastward, and one of $4\frac{3}{4}$ fathoms lies $1\frac{1}{2}$ miles southward, of the south point of Teinga.

A patch of 6 fathoms, the existence of which is doubtful, is shown on the chart at 7 miles N. $89^{\circ} W.$ from the north end of Teinga.

Sangboy islands, or Hare's Ears, are two remarkable islands, 617 and 856 feet in height, and may often be clearly seen when the high land of Basilan is obscured by clouds. The hill of the southern or higher island resembles a cupola, while the land round it is low. A shoal with a least depth of 2 fathoms lies from one to $3\frac{1}{2}$ miles southward of the southern end of the southern island, a shoal of $2\frac{3}{4}$ fathoms lies $1\frac{3}{4}$ miles eastward, and another of $2\frac{3}{4}$ fathoms 4 miles westward, of the same point.

Kalublu (Kaludlud) and Dassalan are low islands which are said to produce good timber. A shoal with a depth of $2\frac{1}{4}$ fathoms extends 2 miles westward from Kalublu; and Griffin rocks, covered by $1\frac{1}{2}$ fathoms, lie $2\frac{3}{4}$ miles westward of the same island. These rocks do not always break, and should be given a good berth. Besides these dangers, and a patch of 2 fathoms lying east-south-eastward 2 miles from the south point of Dassalan, the chart shows many shoal patches about these islands.

Satiold islet and the two Lakits rocks are on the south-western edge of the Sangboy bank. To the north and north-west of Satiold, and up to a distance of 5 miles from it, there are many charted depths of $2\frac{3}{4}$ to $4\frac{3}{4}$ fathoms, and there may be dangers in this locality not yet discovered.

Favorite bank, south-westward of Sangboy bank, has not been sounded out; the *Nassau* in 1871 carried a depth of from 6 to 10 fathoms for 8 miles over it.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Clearing mark.—If bound south, Mount Bahu summit, in Sulu island, bearing S. $\frac{3}{4}$ W., leads eastward of the bank in not less than 18 fathoms; the shoaler water being about 5 miles to the westward of that line. See view on charts 928 and 2576.

Pilas island (*Lat. 6° 39' N., Long. 121° 36' E.*), lying about 10 miles westward of Basilan, is $7\frac{3}{4}$ miles in length, north and south, with a greatest breadth of 2 miles. The land is low and flat except at the north end, where the higher of two hills has an elevation of 919 feet. The southern part of the island is narrow, covered with mangroves and intersected by numerous channels which at high water probably separate the southern portion from the main body of the island. A shoal with $2\frac{3}{4}$ and $4\frac{3}{4}$ fathoms on it extends about one mile southward from the south point of the island, and at $2\frac{1}{4}$ miles S. 12° E. from the point is a shoal with 5 fathoms on it. On the east side is the small island of Tagutu.

On the western side there are many small islands and several shoal patches, extending off for about 6 miles from Pilas; between some of these islands there are good anchorages, especially one on the north-west part of Pilas; but a good local pilot is necessary for entering it, particularly if the northern entrance be taken.

Puju bank, extending northward nearly $1\frac{1}{2}$ miles from the northernmost islet, has a depth of $1\frac{1}{2}$ fathoms on its northern part, and must be avoided, as also a patch of $3\frac{3}{4}$ fathoms lying three-quarters of a mile north-north-west from the north extreme of Pilas, and Tamila rock, above water, lying half a mile from the shore with 5 fathoms around it.

Coral patches.—Patches of 2 fathoms lie south-westward 3 miles and west-south-westward $4\frac{3}{4}$ miles from the south point of Pilas island.

Mindoro shoal, or Batu Bolu, of $2\frac{3}{4}$ fathoms, lies N. 86° W. distant 10 miles from the south extreme of Pilas island.

Takut Pabunuan is a bank of sand and shells lying with its shoalest part 19 miles N. 72° W. from the western Bolod island, and $16\frac{1}{2}$ miles northward of Guhangan island. It is 5 miles in extent from north to south, within the 10-fathoms line, and about 2 miles in width; in the middle is a ridge with a general depth over it of about $4\frac{1}{4}$ fathoms, but with patches of $2\frac{3}{4}$ and 2 fathoms.

Halcon or Wilhelmina rock, lying 6 miles east-north-eastward of the 2-fathoms patch on Takut Pabunuan, is awash at high water and steep-to.

Pilas channel, between Pilas island to the west and Baluk Baluk and Mataha to the east, has a width of 3 miles and is clear and deep, the least depth being patches of 9 fathoms in mid-channel, eastward

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

of Tagutu and westward of Mataha. The tidal streams in it attain a velocity of 6 knots at springs, the flood setting north and the ebb south.

Baluk Baluk island, 4 miles eastward of Pilas island and 5 miles westward of Basilan, rises to a peak, 525 feet in height, at the northern end; the southern part is low.

Mataha island, about 3 miles southward of Baluk Baluk island, is low, flat, and wooded; it is steep-to on all sides except the northern. A rocky patch of $1\frac{1}{2}$ fathoms lies half a mile northward of the northern end of Mataha.

LIGHT.—A *white fixed* light, elevated 62 feet above high water, and visible in clear weather from a distance of 10 miles, has been established in a white wooden framework tower, 52 feet in height, erected on the south-eastern point of Mataha island.

Teinga Laguit, Odel, Dauan, and Langasmate are described among the islands West of Malusa bay, *see* page 251.

Tamuk (*Lat. 6° 28' N., Long. 121° 49' E.*) is about a mile in extent and 180 feet high; the channel between it and Basilan is clear. The islet Kankuman, $1\frac{1}{4}$ miles east-south-east of Tamuk, is clean-to; a shoal with a least depth of 6 fathoms lies one mile southward of the islet.

TAPIANTANA GROUP.—Tapiantana island, lying $5\frac{1}{2}$ miles southward of the south point of Basilan, is about $2\frac{1}{4}$ miles long, east and west, $1\frac{1}{4}$ miles wide, and has on its western side a hill which rises gently to an elevation of 938 feet above the sea; the eastern part is low, and ends in an extensive reef, which dries at a distance of about $1\frac{1}{4}$ miles to the eastward and incloses the small islet Haluluko. The southern edge of the reef is wooded, forming the narrow island Tolon Pisa, $2\frac{3}{4}$ miles long, and is very steep, the chart showing no bottom with 55 fathoms at a distance of one cable from the trees. The island is inhabited.

Bubuán, $1\frac{1}{2}$ miles to the northward, is about 2 miles in extent, and has the same appearance as Tapiantana with a hill 794 feet high. In the channel between the two islands there is a shoal with 3 feet of water over it.

Salupin and Timbungan are two low, wooded islands on one reef at the eastern edge of the bank on which the group is situated; this bank is very steep, there being a depth of 91 fathoms at little more than a cable to the eastward of the reef.

Bihintinusa, the most northern of the group, is a small, low islet, sandy and wooded, lying less than a mile from the south coast

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

of Basilan; a bank with a least depth of one fathom and $2\frac{3}{4}$ fathoms at its eastern end, extends to a distance of 2 miles eastward from the islet into deep water, there being no bottom with 60 fathoms at one cable from the end of the spit. See also page 251.

Lanauán island lies about 2 miles south-westward of Babuán; it is $1\frac{1}{2}$ miles long, north and south, half a mile broad, and has two hills on it, 318 and 394 feet in height respectively; a reef projects two-thirds of a mile south-south-eastward from its southern end, on the outer part of which the depth is 2 fathoms. The island is inhabited.

The depths in the channels between the islands of the Tapiantana group are from 7 to 12 fathoms, with deeper water at the entrances.

Tides.—At Tapiantana it is high water, full and change, at 6h. 3m., rise at springs $7\frac{3}{4}$ feet.

Tidal streams.—The tidal streams in the channel southward of Tamuk set nearly north-west and south-east, the flood in the former direction; they turn at $4\frac{1}{4}$ hours after high and low water. The tides are greatly influenced by the monsoon; the ebb attains a rate of from 2 to $2\frac{1}{2}$ miles an hour at springs in the south-west monsoon.

SAMALES GROUP.—**Tatalan island** (*Lat. 6° 14' N., Long. 121° 50' E.*), $1\frac{1}{2}$ miles long, north and south, and three-quarters of a mile broad, rises in the northern part in a hill 387 feet in height; it lies 12 miles south-westward of Basilan island, and 4 miles westward of the edge of the bank of soundings. The passage between Tatalan and Lanauan, called Tapiantana channel, 6 miles wide, is clear of danger; there are several detached banks in it upon which the depths are from 7 to 10 fathoms; one of these, nearly midway between the two islands, with depths of 8 and 9 fathoms, is named Takut Pababat. With the south-east stream, a line of strong ripples sometimes marks the edge of the bank, which falls suddenly into deep water.

Batumandi, a rock above water, as charted, but said to be awash, with deep water around it, lies 2 miles S. 84° W. from the north-western extreme of Tatalan, and at $3\frac{1}{4}$ miles westward of Batumandi there is a narrow bank $1\frac{1}{2}$ miles in length north and south, with a least depth of 7 fathoms, sand and rock. Caution is necessary when navigating in the vicinity of these shoals.

Bolod islands are two small islands of nearly the same appearance, about $1\frac{1}{4}$ miles apart in an east-north-east and opposite direction, the eastern island lying $13\frac{1}{2}$ miles westward of the northern end of Tatalan; the western Bolod is 643 feet in height, and the eastern 597 feet. Tirana rock, a dangerous little patch of flat rock, awash at low water, lies about half a mile northward of the eastern

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Bolod, and a shoal of $3\frac{3}{4}$ fathoms extends about one mile south-eastward from that island.

Sibarut bank, of sand and rock, $1\frac{1}{2}$ miles in extent, with a depth of 6 fathoms on it, lies S.W. $\frac{1}{4}$ W., distant 5 miles from the western Bolod.

Sunga shoal, or Takut Sungu, lying south-eastward $4\frac{1}{2}$ miles from the eastern Bolod, is 2 miles in extent in a north-east and south-west direction, nearly $1\frac{3}{4}$ miles in breadth, and consists of sand, gravel, and rock. Near its south-west extremity are rocks with a depth of one fathom; about 2 cables northward of these there is a patch of $2\frac{3}{4}$ fathoms, and at half a mile eastward the depth is $4\frac{1}{4}$ fathoms. The bank is steep-to, with depths of 11 to 14 fathoms on the north and north-east, 22 fathoms on the south, and 18 fathoms on the south-west and west sides.

Bukutua and **Belauan**, or Bulan, lying southward of Tatalan island, and extending 4 miles in a north-west and south-east direction, are separated by a narrow channel one cable in width, with a depth of from $1\frac{1}{2}$ to $4\frac{1}{4}$ fathoms. The first of these islands is low, with a hill 157 feet in height at its eastern end; a shoal with $2\frac{3}{4}$ fathoms on it lies half a mile westward of it, abreast the centre. Belauan has a round mountain 1,184 feet high near its centre.

At $1\frac{1}{4}$ miles north-east of Belauan are the two Dipulut or Dipolod islets; the easternmost, which is the larger, is 250 feet in height, and is three-quarters of a mile from the edge of the bank of soundings.

Mamad islet, $1\frac{3}{4}$ miles to the westward of Bukutua, is 118 feet high, and has no dangers beyond the distance of a quarter of a mile from its shore, except a patch of $3\frac{3}{4}$ fathoms lying half a mile east-south-eastward from its south end.

The channel between Bukutua and Tatalan is deep, clear, and $2\frac{1}{2}$ miles in width.

Tonkil (*Lat. 6° 1' N., Long. 121° 51' E.*) is a low crescent-shaped island, with the concave side northward, nearly 12 miles in extreme length east and west, on the south-eastern edge of the great bank; southward of Tonkil, the 100-fathoms contour line approaches to the distance of about one or 2 cables from the coast, and at a quarter of a mile from Ton Eguet, the eastern point, there is no bottom at 55 fathoms. The passage between Tonkil and Belauan is about 3 miles in width, but a shoal flat extends from the Tonkil shore within the horns of the crescent, upon which there is a depth of $2\frac{3}{4}$ fathoms distant but $1\frac{1}{4}$ miles from Belauan.

Balanguingui islands, consisting of Mamanok, Parol, and the principal island Balanguingui, with several islets, are situated 2 miles west of Tonkil.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Balanguingui island, together with the numerous small islands lying on the same reef, is about 4 miles in extent, and seen from a distance has the appearance of one island. They are coral islands surrounded by reefs, with lagoons and narrow tortuous channels between them, only navigable by the light boats of the Moros.

Takutsuligan is a patch of 3 fathoms lying $1\frac{1}{4}$ miles west of the south-western point of Balanguingui.

Parol, lying one mile north-eastward from the northern part of Balanguingui, is $1\frac{1}{2}$ miles long north-west and south-east, is fringed by a narrow reef, and has shoal ground extending more than half a mile from its north-west and south-east points.

Mamanok, lying nearly $2\frac{1}{4}$ miles westward of Parol, is about three-quarters of a mile in extent, and is surrounded by a narrow reef. Shoal water, with a depth of $3\frac{3}{4}$ fathoms, extends two-thirds of a mile off the south side.

Bangalao, Manungut, and Simisa are three islands lying westward of Balanguingui; Manungut, the westernmost of the Samales group, lies about a mile westward of the north end of Bangalao; it is half a mile in extent and 276 feet in height; the other two islands are low, and separated by a deep channel $2\frac{1}{2}$ miles wide. A shoal of $1\frac{1}{2}$ to $3\frac{1}{4}$ fathoms extends one mile south-west from Bangalao, and one of $1\frac{1}{2}$ to 2 fathoms projects northward $1\frac{1}{2}$ miles from the same island.

Tidal streams and whirlpools.—Navigation about these islands is dangerous on account of the strong currents and eddies. The master of the *Amy Warwick*, who for many years traded from Singapore to the Eastern archipelago, found that at times the tides between Sulu island and Balanguingui ran at the rate of 8 knots an hour, with strong eddies and whirlpools. On the flood or north-west stream, the pool is close under Sipak island, and on the ebb it lies close to the south-east of Simisa, and under Bitinan, of the Sulu group.

Off-lying shoal (*Lat. 5° 30' N., Long. 122° 3' E.*).—A shoal is charted in a position S.S.E. 32 miles from the southern part of Tonkil island.

SULU GROUP.—**Sulu island**, from which the archipelago is named, is 34 miles in length east and west, and from $2\frac{1}{2}$ to $12\frac{1}{2}$ miles in breadth. The island is a series of hills and valleys, with good cultivation and park-like scenery; Mount Temontangis, the highest mountain, elevated 2,894 feet above the sea, is near the west end. The coasts, especially the northern, are in general wooded, clean, and steep to: as are also the islands and islets that border them. They

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

are slightly indented, and form several bays where there is anchorage, the most sheltered and secure in both monsoons being that of Dalrymple or Tulian on the north side. See view on charts 928 and 2576.

The **climate** of Sulu, although the island is so near the equator, enjoys a much more even and cooler temperature than that of Mindanao; the nights are sensibly cool, and, although the island abounds in water, mosquitoes are not troublesome. The Sulu islands are seldom, if ever, visited by gales, although strong winds and heavy falls of rain are not uncommon.

The **population** of the Sulu group in 1899 amounted to 17,000, according to the estimate of the Philippine Commission. Amongst these, four distinct races may be distinguished, of which the Guimbanos are the indigenous inhabitants of the island, and the Moros the dominant race, that regulate the commerce and traffic.

Kapual island, situated at the north-east extremity of Sulu island, is circular, about $3\frac{1}{2}$ miles in diameter, east and west, and 1,066 feet in height on the southern side; a coral bank extends off the north point of the island for a distance of about 3 cables; elsewhere it is clean and steep-to, except to the south-west, where it is united to Sulu by a bank of sand, with $2\frac{3}{4}$ to 4 fathoms over it in places. On this bank is the islet Bulicutin.

The Kapual channel between Kapual and Sulu is deep at the eastern end, but has only $1\frac{3}{4}$ fathoms at the western part.

Goitya shoal, $1\frac{1}{2}$ cables in extent, and with a depth of $1\frac{1}{2}$ fathoms, lies one mile north-west of Kapual.

Bitinan island, lying north-east of Kapual, and separated from it by a clear channel three-quarters of a mile in width, with a depth of 10 fathoms, is $1\frac{1}{2}$ miles in extent and 722 feet in height; it is clean and steep-to. A deep and clear channel 3 miles in width separates Bitinan from Manungut island, the western of the Samales group.

Tidal streams.—In the channel between Bitinan and Kapual the tidal streams run at the rate of 3 knots an hour.

Plan 927, Dalrymple harbour.

DALRYMPLE HARBOUR (*Lat. 6°0'N., Long. 121°19'E.*), situated at the eastern end of the north coast of Sulu, and partly formed by the island of Tulian, is the only well-protected harbour in this fertile island. Good anchorage will be found during the north-east monsoon under the lee of Tulian island; the natives report that during this monsoon the wind seldom blows home. The depths in the anchorage are from 4 to 9 fathoms.

General charts 928, 2576, 943, 1263.

Plan 927, Dalrymple harbour. Var. 1° 30' E.

Tulian island (*Lat. 6° 3' N., Long. 121° 18' E.*), nearly $1\frac{1}{4}$ miles in length in a north-east and opposite direction, and 8 cables in width, is steep on the north-west side, attaining a height of 672 feet, the summit being covered with grass. To the south and south-west it is bordered by a reef about a cable in width, and in the latter direction a flat with a depth of $3\frac{3}{4}$ fathoms extends $2\frac{1}{2}$ cables from the shore. There is a well on the south-east side of Tulian. *See view on plan 927.*

Buol or Boal, situated on the coast $1\frac{1}{2}$ miles westward of the south point of Tulian island, was formerly the largest town in this part of the island of Sulu, but the place was partially destroyed by the Spaniards in 1872.

From Dixon point near Buol the coast trends east-south-eastward, forming a bight south of Tulian; the bight then trends east-north-east to Petley point, and is fronted by a flat and several shoal patches, upon which there are depths of from 2 to 3 fathoms. Westward of Petley point is the large village of Karang-karang or Limawa.

Dangers.—In the eastern or Gray entrance there are two patches of $2\frac{3}{4}$ fathoms, less than a cable apart east and west, the westernmost of which lies East $8\frac{3}{4}$ cables from Martin bluff on Tulian island. A bank, with depths of $3\frac{1}{4}$ to $4\frac{1}{4}$ fathoms, lies south-eastward, distant 2 to 4 cables from Martin bluff; a patch of 2 fathoms on a bank of $4\frac{3}{4}$ fathoms lies 6 cables S.E. by E. $\frac{1}{4}$ E. of Balseiro point, on Tulian; and in the western entrance, or White passage, there is a 2-fathoms patch lying N. by W. 4 cables from Baverstock point on the main island.

Directions.—Anchorage.—A large vessel should enter Dalrymple harbour by the eastern entrance, rounding the north end of Tulian island and bringing the village of Karang-karang to bear S. $\frac{1}{4}$ E., steer for it, giving the eastern side of Tulian a berth of about half a mile in order to avoid the shoal ground of $3\frac{1}{4}$ fathoms lying south-eastward of Martin bluff. When the south end of Tulian bears W. $\frac{1}{4}$ S., it may be steered for and anchorage taken up with Martin bluff bearing between North and N.E. by N. in from 7 to 9 fathoms, sand and shells. A good berth is with Martin bluff bearing N.N.E. $\frac{3}{4}$ E., and Balseiro point W.N.W., distant nearly a quarter of a mile, in a depth of 8 or 9 fathoms.

Tides.—It is high water, full and change, at Dalrymple harbour at 7h.; springs rise $4\frac{1}{2}$ feet, neaps $3\frac{1}{4}$ feet.

Chart 928, Sulu archipelago.

Coast.—From Buol the coast trends westward for $3\frac{1}{2}$ miles, and then curving first to the south-westward and afterwards gradually

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

round to the northward, forms a bay $3\frac{1}{2}$ miles across to Tuk Tuk point. The bay is bordered by a reef, which is steep-to; at half a mile from the reef, with Kaduayan village bearing S.S.W., is Eseo bank, of 2 cables extent, covered by 2 fathoms water, and surrounded by depths of 5 to 7 fathoms. From Tuk Tuk point the coast trends north-west 3 miles to Igasan point, near which is Bankungan island; from thence westward $8\frac{1}{2}$ miles to Diangappik point, the northern limit of Sulu roadstead, it is clean and steep-to, with the exception of the first 3 miles, off which shoal water extends a quarter of a mile.

The villages of Kaduayan, Suok, Bun-bun, and Patikolo, on this coast, offer no resources; the natives are very poor.

Guhangan island (*Lat. 6° 5' N., Long. 121° 16' E.*), $3\frac{1}{2}$ miles north-west of Tulian, is small, about 400 feet high, and very steep-to. It has the appearance of two islands, thickly wooded, and connected by a flat neck of land, the two portions being well opened when bearing S. 65° E. The northern part is slightly the higher, and the island is conspicuous and forms a good landmark. On the eastern side there is an inlet obstructed by a shoal.

A rock is reported by the pilots to exist $2\frac{1}{2}$ miles north-eastward of Guhangan island. Its position is doubtful.

Bankungan island, of triangular form, and 1,145 feet in height, is clean and steep-to, except north-westward, where a reef projects $1\frac{1}{2}$ cables, with a rock awash on it. There is a narrow but safe channel with a depth of 7 fathoms between the island and the coast.

Panganaa islet, one mile east of Bankungan, has some rocks a quarter of a mile eastward of it, with less than 6 feet water, and also some close to its southern part; elsewhere it is clean.

Plan of Sulu roadstead on chart 928.

SULU ROADSTEAD, between Diangappik and Belan points, is open to the northward and westward, and when the wind blows fresh from the north-west vessels go to Maibun road. The coast is clean, and consists of coarse sand; the bottom slopes gently, and the 5-fathoms contour line is generally distant 2 cables from the shore. Two shoal spots, with 4 fathoms over them, lie $1\frac{1}{2}$ and $2\frac{1}{4}$ cables, respectively, northward of the mole lighthouse. A reef about $1\frac{1}{2}$ cables in width, that uncovers in parts at low water, borders the beach before the town, leaving a passage of one foot depth to a lagoon that penetrates to the southward. Two forts command the road, in which the depths are from 6 to 12 fathoms or more.

General charts 928, 2576, 943, 1263.

Plan of Sulu roadstead on chart 928. Var. 1° 30' E.

Anchorage.—The usual anchorage is north-westward of the light-house, in from 12 to 14 fathoms. During the north-east monsoon vessels are sometimes obliged to leave Sulu roadstead and take up an anchorage under the lee of Marongas island; this is not a good anchorage, as the bank is steep and the tidal streams strong.

LIGHTS (*Lat. 6° 3' N., Long. 120° 59' E.*).—From a white octagonal tower 30 feet high, on the north arm of the mole in Sulu harbour, is exhibited, at the height of 37 feet above high water, a *red fixed* light, visible 7 miles in clear weather. For arc of visibility, *see* Light list.

From a column at the outer end of the mole, a *green fixed* light is shown.

Tides and tidal streams.—It is high water, full and change, in Sulu roadstead, at 7h. 28m.; springs rise 4½ feet. The flood stream sets south-westward, and the ebb to the north-east.

Sulu (Jolo) town.—Sulu or Jolo is a port of entry and the principal town on the island. The town consists of three or four streets, planted with rows of banana and cotton trees, and is surrounded by a wall on which are small watch towers. The town is clean and well kept. The Chinese town is built on a long wharf about 250 yards westward from the town proper. A substantial stone mole runs out in a north-west direction for about 350 feet from the town, built in the shape of a cross, and makes a very good landing place for boats; it has a wooden extension, with a depth of 24 feet at low water at its outer end. Vessels approaching or leaving the wharf should be careful to avoid the reefs on both sides. The population in 1903 was about 1,270. *See* view on chart 928.

Telegraph cable.—A submarine cable is laid between Sulu and Samboanga in Mindanao, thus connecting the island with the general telegraphic system; there is also a cable to Siassi. Sulu is a telegraph station.

Wireless telegraph.—A wireless telegraph station has been established at Sulu; call letters F S.

Imports and exports.—Trade at this place is dull, and is mostly in the hands of Chinese, who do a large business in fitting out boats engaged in the pearl fishery.

The imports are principally rice, hardware, and cotton goods; exports, copra, pearl-shells, pearls, hemp fibre, shark's fin, *bêche-de-mer*, and a small variety of hard woods.

There is a pearl oyster bed in the channel between Sulu anchorage and Marongas, giving occupation for 60 or 70 boats.

General charts 928, 2576, 943, 1263.

Plan of Sulu roadstead on chart 928. Var. 1° 30' E.

The approximate value of imports in 1908 was \$292,073; and of exports \$224,536.

Shipping.—In 1908, 31 foreign vessels entered, as against 20 in 1907, while 149 coastwise vessels called, an increase of 71 over the number entering in 1907.

Supplies.—Small supplies of fresh meat, fish, fruit, and vegetables can be obtained in the market. A supply of coal is kept for the use of Government vessels and for other official purposes.

At Mubu point the large fair or market is held once a week; cattle, poultry, and vegetables are brought here in abundance for sale.

Water.—There is a 2½-inch pipe laid down on the wharf, from which a good supply of water can be obtained. There are several wells within the town of Sulu, but the water is not particularly good, and the best is obtained from a spring on the beach at Mubu point, about three-quarters of a mile north-eastward. Its situation is a curious one, the water bubbling up in a strong stream between high and low water mark into a sort of rocky basin.

Coast.—From Belan point the coast trends west-south-westward for 4½ miles to Pugut point, and from there curves towards the south for another 4½ miles as far as Silangan point (*Lat. 5° 57' N., Long. 120° 52' E.*), the western extremity of Sulu. All this part is safe to approach, a depth of 4½ to 10 fathoms being found at the edge of the narrow reef that borders the shore.

Takut Buansa, a shoal with a least depth of 3¾ fathoms, lies half a mile west-north-west of Mangalis point, about 2 miles westward of Belan point; about midway between this shoal and Belan point, at 7 cables from the shore, there is a small coral patch of 4 fathoms.

Tulian island, lying 1¼ miles off Pataluan point, is about 208 feet in height and steep-to: a rock, with a depth of 4 feet on it, has been reported in the channel inside Tulian island, about 3 cables east-south-eastward of the island, but its position is doubtful, and there is a depth of only 4¾ fathoms at the distance of 4 cables from the point.

Busson rock, which lies about 3 cables north-west of Tulian, is awash at low water, with 19 fathoms 2 cables outside it.

Chart 928, Sulu archipelago.

Matos shoal, about one mile north of Silangan point and half a mile from the shore, is covered by a depth of 5 fathoms.

A shoal of small extent, over which the bottom was visible, is reported to exist about one mile S. 60° W. from Silangan point. The position is doubtful.

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

ISLANDS NORTH-WEST OF SULU.—These form a group of six large islands, and several small ones, separated from the north-west point of Sulu by a clear channel $2\frac{1}{4}$ miles in width, and with a depth of from 15 to 30 fathoms.

Plan of Sulu roadstead on 928.

Marongas island (*Lat. 6° 6' N., Long. 120° 57' E.*), lying $3\frac{1}{2}$ miles north-westward of Sulu lighthouse, is 285 feet in height, and is separated from Pangasinan by a channel half a mile wide, in which there is a depth of 8 fathoms, with a patch of $3\frac{3}{4}$ fathoms in the middle of its eastern approach. Anchorage may be had in 7 to 12 fathoms at the distance of 2 cables from the west coast of this island, but the currents are strong.

Chart 928, Sulu archipelago.

Pangasinan is 548 feet high; at three-quarters of a mile east-north-eastward of the island there is a bank, one mile in extent, with a depth of $3\frac{1}{4}$ fathoms over it.

Hegad island, low and flat, is separated from Pangasinan and Bubuan by safe and deep channels. The little islet Tautitau, one mile west of it, has reef projecting from its east and west ends, but is steep-to on the north and south sides.

Minis island, the north-easternmost of the group, is one mile in extent, and is low, flat, and steep-to.

Bubuan is 498 feet in height on the north side; on the south side, which is low and flat, are two inlets of no importance. The channel that separates Bubuan from Kabukan is divided into three passages by the little islet Lahat-lahat and the Concas bank; these passages are about 2 cables wide, and have a depth of $5\frac{1}{2}$ fathoms.

Kabukan is 4 miles in length east-north-east and west-south-west, $\frac{1}{2}$ miles broad, about 50 feet in height, and perfectly flat. On the south side it is clean, but the north and west sides are bordered by a reef which extends half a mile to the westward; the eastern part ends in several islets, known as the Palliagan islands, covered with mangroves.

Aguirre bank (Tong-Tong), within the depth of 10 fathoms, extends to 3 miles from the south-west coast of Kabukan, and is from one to 2 miles wide north and south. The shoalest part, with a depth of 4 fathoms, lies about $2\frac{1}{4}$ miles from the western extreme of Kabukan.

A patch of 3 fathoms is charted at a distance of 6 miles west-south-west of Kabukan, with $5\frac{1}{2}$ and 9 fathoms near it.

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Pantokunan, situated $3\frac{1}{2}$ miles north-west of Kabukan, circular in form, and about one mile in diameter, is low and flat; it is clean and steep-to on the south side, but bordered by a coral reef to the distance of one-third of a mile on its northern side. This island appears to be on the Pangutaran bank, hereafter described, as in the channel between it and Kabukan there is a depth of more than 100 fathoms.

SOUTH-WEST COAST of SULU.—**Bunga point** (*Lat. $5^{\circ} 55' N.$, Long. $120^{\circ} 52' E.$*), 2 miles south of Silangan point, is surrounded by a reef which extends along the coast from before the town of Bauisa to the northward, as far as the village of Parang to the east. The reef is about half a mile in width, and near its edge the depth is 7 to 14 fathoms. From Bunga point the coast trends south-eastward for $4\frac{1}{2}$ miles to Kabalian point.

Sulade island, which lies south-west about 7 miles from Bunga point in Sulu island, is very flat, and forms a complete lagoon enclosing an archipelago of islets, with an entrance on the south, navigable by boats at high water. On the western extreme are two remarkable trees like fan-palms, which, on approach to the island from north or south, appear like the sails of two prahus.

There is anchorage on the west side of Sulade island in from 6 to 10 fathoms, sand, the bottom being even, and the depths decreasing regularly to the shore.

Strong currents prevail, a rate of $3\frac{1}{4}$ knots an hour having been experienced at ordinary tides, running principally to the north-east; it has also been found setting west-north-west at the rate of $2\frac{1}{4}$ knots.

Shoal.—A shoal of small extent is reported to lie about $1\frac{1}{4}$ miles S. 70° W. from Bunga point; the position is doubtful.

Parang.—This village, situated 2 miles south-eastward of Bunga point, and consisting of thirty or forty houses in line, is built on piles in the sea, each house being connected with the shore by a separate bridge of palm-stems. H.M.S. *Mosquito* anchored in 8 fathoms about half a mile from the shore, close to some fishing stakes, with Mount Temontangis N. 31° E., and Tubingatan point S. 64° E. From this anchorage the water shoals gradually towards the landing place opposite the east village; on each side of the channel there is a reef with fishing stakes on it.

Batolaki bank is a group of six shoals, lying three-quarters of a mile south-east of Kabalian point, and occupying a space of 7 cables extent, covered by one to 3 fathoms with one rock awash at low water—generally marked by a stake—to the westward; the depth between the shoals is 6 to 7 fathoms.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

Buoy.—A black buoy is moored on the south side of the Batolaki bank.

Clearing marks.—Bunga point open westward of Tubingatan point, the point west of Kabalian, bearing N.W. $\frac{3}{4}$ W. leads south-west of Batolaki shoals ; and Mount Mabintin N.E. $\frac{3}{4}$ E. leads south-east of the shoals.

Plan of Maibun anchorage on chart 928.

MAIBUN BAY (Lat. $5^{\circ} 55' N.$, Long. $121^{\circ} 1' E.$) is much frequented during the north-east monsoon, but is liable to a heavy swell during the south-west monsoon, which sets in during June. The bay is 8 miles wide between Kabalian and Putik points, and $2\frac{1}{2}$ miles deep to the northward ; at its head are the river and town of Maibun.

The shores of the bay are bordered by a narrow coral reef, and a depth of 5 fathoms will generally be found at the distance of from 2 to 3 cables from the shore. The western coast is wooded, with cleared spaces ; the towns of Lagassan and Lubang are on this shore. The eastern shore is covered by mangroves ; the town of Punungan lies not far from Putik point.

Dangers.—Within the bay, and fronting the river, there are two shallow banks of coral and sand, on the southernmost of which a small spot is always dry, and is named Dry bank ; the northernmost has about 2 feet of water on it.

Between the northern bank and the shore reef northward of it, are several shoal patches, with from 2 to $3\frac{3}{4}$ fathoms on them, and westward $1\frac{1}{2}$ cables from the bank is a patch of 3 fathoms.

There are, besides, four shoals, one of which is marked by a buoy ; Marban bank, with one fathom least water on it, lies S.E. by E. $\frac{1}{2}$ E., 5 cables from the reef of Dry bank ; and two patches of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms lie respectively East, 6 cables, and N. 83° E. $5\frac{1}{2}$ cables from the reef of Dry bank. The depths between the banks and shoals and the shore are from 5 to 15 fathoms.

Buoy.—A small shoal of $1\frac{1}{2}$ fathoms, situated 5 cables S. by E. from the reef on Dry bank, is marked on its eastern side by a black conical buoy.

Directions for Maibun anchorage.—There are two good channels between the shoals into the anchorage off the town, but the navigation is somewhat difficult, owing to the want of leading marks. The easternmost, between Marban bank and the eastern shore of the bay, seems to be the better ; it is about half a mile wide, and has not less than 5 fathoms in the middle. Mount Mabintin (the

General charts 928, 2576, 943, 1263.

Plan of Maibun anchorage on chart 928. Var. $1^{\circ} 30'$ E.

hill 1,519 feet high, north-eastward of Maibun), kept on a N.E. by N. bearing, will lead to the entrance of the eastern channel.

The other channel is that between Dry bank and Marban bank. If this passage be taken, Dry bank should not be brought to bear northward of N. $\frac{3}{4}$ E. until the $1\frac{3}{4}$ -fathoms patch southward of it is passed; this bank, should the buoy not be in position, can generally be distinguished by the fishing stakes on it, and even at high water by the light colour of the water over it. When this patch bears East a course should be steered to pass between Dry and Marban banks.

Anchorage.—Vessels can anchor anywhere in the bay in from 6 to 10 fathoms, but the usual anchorage is about $3\frac{1}{2}$ cables southward of the town, with Dry bank bearing S. 41° W., in 8 or 9 fathoms, coral sand.

Tides and tidal streams.—In Maibun bay the tides are irregular; it is high water, full and change, at 6h. 23m.; springs rise $5\frac{1}{4}$ feet. Inside the banks the stream is insensible, and in the offing it is strong and irregular. The flood stream sets westward, ebb eastward; both streams over-run the times of high and low water on the shore by about two hours.

Maibun town (Lat. $5^{\circ} 56'$ N., Long. $121^{\circ} 1'$ E.) is the residence of the Sultan of Sulu. The houses are built on piles on the outer edge of the bar at the mouth of the river, which has only a foot of water on it at low tide.

Supplies.—Fresh provisions can be obtained, but are not abundant; vegetables are scarce; fruit is plentiful.

Chart 928, Sulu archipelago.

Teomabal island lies south-west $3\frac{1}{2}$ miles from Putik point. It is small, low, and surrounded by a coral reef which projects to about half a mile on the south-east side. Coral patches of 4 and 5 fathoms extend nearly $1\frac{1}{2}$ miles south-eastward of the island. The greater part of the interior of the island is occupied by a lagoon that nearly dries at low water.

Patian and **Lumbian** islands are clean and steep-to: in the channel that separates them there is anchorage in a depth of 12 fathoms. A patch of 3 fathoms lies off the south-west point of Lumbian, in the southern approach to the anchorage.

Villamil rock, situated nearly one mile southward of Putik point, and midway between Patian island and that point, is small, with 4 feet of water on it, and is surrounded by deep water.

Tutu bay, eastward of Putik point, is only separated from the bay on the north side of Sulu island by a low isthmus, $2\frac{1}{2}$ miles in

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 30' E.

width. A narrow steep reef skirts the western shore of the bay, but from the northern, and also from the south-eastern shore between Tutu point and Karangdato point, the reef extends to $1\frac{1}{2}$ miles from the coast.

The towns Pandanpandang, Karongdong, and Sang are on the eastern shore.

Serantes shoal, covered by $1\frac{1}{2}$ fathoms, lies three-quarters of a mile from the western shore, about 3 miles east-north-eastward of Putik point.

Anchorage may be had in from 9 to 13 fathoms in the bays on the western side of Tutu bay, and in the inlets in the reef on the northern and eastern sides. The bay is sheltered from the southerly winds by Pata island.

Pata island (*Lat. 5° 49' N., Long. 121° 10' E.*), circular in shape, and about $4\frac{1}{2}$ miles in diameter, rises in the centre to a mountain 1,434 feet in height. The shores are clean and steep-to, except on the eastern side, from which a reef extends 2 miles eastward, having upon it an island almost joined to Pata, and Tankuiki rock near the south-eastern edge.

The small islet Damokan lies 4 cables to the north-west of Pata.

Dong Dong island, in the passage between Pata and Karangdato point, is 2 miles long, north-west and south-east, low, flat, and surrounded by a steep reef. Tambulian, a small round island with a shoal extending to half a mile from its south-east shore, lies three-quarters of a mile north-west of Dong Dong. Anchorage may be had south-west of Tambulian in a depth of 8 fathoms.

Pitogo bay, lying between Karangdato and Tandikan points, has not been closely examined; the shore is bordered by a shoal which is about 3 cables in width on the eastern side of the bay.

The edge of the bank on which the archipelago is situated is close to the shoal to the southward of Tandikan point, and is at the distance of one mile from it, south-east of the point; it is also one mile from Tandu point, the eastern extreme of Sulu.

The towns Higan and Ganon are situated in the bay lying between Tandikan and Tandu points, which is entirely filled up by a shoal extending more than a mile from the shore.

TAPUL GROUP.—This group is situated between the Sulu and Tawi Tawi groups.

Tidal streams.—In the channels between the islands the tidal streams are strong, and overrun the times of high and low water by two to three hours.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Tapul and **Bolipongpong** (Lugus).—These two fertile and well-cultivated islands lie from 8 to $15\frac{1}{2}$ miles southward of Kabalian point in Sulu; both have conical peaks, the former being 1,676 feet, and the latter 955 feet in height. The narrow channel between the islands is only fit for boats. They are apparently clear, except for the reef extending eastward from Bolipongpong about $1\frac{3}{4}$ miles; the south end of Tapul island is also fronted by a reef extending one-third of a mile off. A reef, the extent of which is not defined, also extends from the north-west end of Bolipongpong; the hill, 1,010 feet high, on the north end of Lapak island, open westward of the west point of Bolipongpong island, leads westward of this reef.

At one mile from the south coast of Bolipongpong, the depth is 9 and 10 fathoms, and anchorage may be had in the bight on that side of the island, east of the little islet Gondra, in 8 fathoms.

The town of Kaunpan is on the north side of Tapul.

Kabingaan and **Taluk** are two low flat islands on the same reef, with a lagoon inside between them, on the western side of which is the smaller island Boacoa. Pakia island, close to the west side of Kabingaan, is also low, and has a narrow reef projecting $1\frac{1}{2}$ miles to the south-east, with $1\frac{1}{2}$ fathoms on the end of the reef, and 11 fathoms close to off it. There are two villages on the islands.

A patch with a least depth of 9 fathoms lies 2 miles northward of Taluk.

SIASSI (*Lat. $5^{\circ} 32'$ N., Long. $120^{\circ} 52'$ E.*) is about $6\frac{1}{4}$ miles in length, north and south, and $5\frac{3}{4}$ miles wide in an east and west direction. Gorro, the highest peak on the island, is situated southward of the centre, in the position given, rises to a height of 1,673 feet, and is surmounted by a remarkable clump of dark trees.

There are several large villages built on the reefs that fringe the south-west and east coasts, the inhabitants of which carry on the pearl fishery, the pearl oyster being found in great abundance in the vicinity.

An extensive reef projects 5 miles eastward from the south-east part of Siassi, on the eastern and southern shores of which are numerous low, thickly wooded, and uninhabited islands; they are very low, the sea in some places washing through them at high water.

Off Bas-Bas point, the south extreme of Siassi, the reef only extends to one-third of a mile, and at the distance of half a mile from the shore there is no bottom at 66 fathoms.

South-west of Siassi the reef runs out for about 3 miles, and is separated from the reef extending south from Lapak by a narrow channel, which varies in width from half to one cable, with a depth of over 5 fathoms, and is only fit for small craft. The reef itself is

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

separated from the island by a very narrow channel with a least depth of 13 feet.

Tara island lies on the reef to the north of Siassi, and is about $1\frac{1}{2}$ miles long in an east and west direction. It is crescent-shaped with the convex side towards Siassi, and the space between the horns is filled with islets and shoals, forming a deep lagoon in the centre. It is very low on the west side, but about 110 feet high on the east.

Tinkalan islet, 8 feet above high-water mark, which in the distance resembles a canoe under sail, is near the northern edge of the foul ground between the points of Tara island.

The channel between Tara and Siassi is 12 fathoms deep, and $2\frac{1}{2}$ cables in width; but there are shoals at both ends of it.

Shoals.—Northward of Siassi island, in the fairway of the channel between that island and Bolipongpong (Lugus) island, three shoals are known to exist, viz.:—

Takut Sungu (*Lat. 5° 37' N., Long. 120° 50' E.*), one mile in length, east and west, and one-third of a mile in width, with a least depth of $2\frac{3}{4}$ fathoms, sand and coral, lies with Tinkalan islet, bearing S. 74° E., distant $2\frac{1}{2}$ miles.

Takut Langon.—About one mile westward of Takut Sungu is the eastern end of Takut Langon, with a depth of 7 fathoms; thence the shoal takes a west-north-west direction for $1\frac{1}{4}$ miles with a breadth of half a mile, having the depth of $4\frac{3}{4}$ fathoms on the shoalest part, near its western extremity. From this position Selun island bears S. 59° W. distant $4\frac{1}{4}$ miles. There is deep water between Takut Sungu and Langon.

Bank.—At 2 miles N.E. $\frac{3}{4}$ E. of Selun island, there is a bank of 6 fathoms, about half a mile in extent.

Kadiajan shoal, lying 2 miles eastward of the north-eastern part of Siassi island, is 2 miles in length, north-west and south-east, within the 5-fathoms limit, and has two heads of 2 and $2\frac{3}{4}$ fathoms.

During the N.E. monsoon heavy tide rips are seen near this bank.

Between this shoal and North Gusun reef northward of Laminusa island, is a channel half a mile broad, with a depth of from 6 to 11 fathoms.

Between Kadiajan shoal and Siassi island are several small shoals, and a reef named Bambagan, which partly dries, is situated half a mile from the shore.

Between Kadiajan shoal and Bambagan is the northern channel to Laminusa anchorage, with a depth of 6 to 11 fathoms, sand.

Inshore of Bambagan reef there is a good anchorage in from 4 to 5 fathoms.

General charts 2576, 943, 1263.

Plan of Laminusa anchorage on chart 928. Var. 1° 40' E.

Laminusa island (Lat. $5^{\circ} 33' N.$, Long. $120^{\circ} 54' E.$), which lies three-quarters of a mile north-eastward of the east point of Siassi, is low, and covered with mangroves; on the north-western part there is a village and cocoanut plantation. Eastward of the island a reef dries out to the distance of a quarter of a mile, and from there the water deepens gradually to the eastward for $1\frac{3}{4}$ miles to a depth of 10 fathoms; at $2\frac{1}{2}$ miles from Laminusa in this direction there is no bottom with 76 fathoms.

The channel which separates Laminusa from Siassi island is divided into two passages by a bank of sand and coral, named Gusun, which dries at low water, and can at all times be seen distinctly. The passage between the bank and Laminusa is clear, but narrow, and winds more than that to the westward of Gusun, which is navigable by vessels of all sizes.

Laminusa anchorage, between Laminusa and the reefs adjacent to the east point of Siassi, is of considerable extent and well sheltered, with a depth of 7 to 10 fathoms, good holding ground; the reef, which uncovers in parts at low water, is steep-to, but cannot be easily distinguished, and must be approached with caution.

Tides and tidal streams.—The tidal stream is very strong at springs; the flood stream sets from east to west and then north through the channel—the ebb from north to south and then east; springs rise 6 feet.

Directions for entering Laminusa anchorage.—Vessels entering Laminusa anchorage from the northward should pass half a mile to the eastward of Tara island in order to clear the reef off Siassi; then a course S. 29° E. will lead in, with a depth of 6 to 11 fathoms, until west of the head of the reef north of Laminusa; a course should then be steered for Punungan island in line with the eastern point of Siassi, S. 4° E., which will clear the reefs off Laminusa; the $3\frac{1}{4}$ -fathoms patch a quarter of a mile westward of North Gusun reef must be avoided. Punungan island can easily be recognised, it being a truncated cone 289 feet high.

The channel between Laminusa and the Siassi reef should only be used in fair weather, and with a favourable light for seeing the edges of the reefs; it is not recommended for large vessels.

To enter the inlet leading to Punungan the channel should be marked, and the vessel kept on the Siassi side, as the reefs on that side show large lumps of coral, and have more water near the edge.

Plan of N. entrance of channel between Lapuk, &c., on chart 2576.

Northern entrance to Siassi, Eastern side.—Tolen point, on the north-west coast of Siassi island, and 2 miles northward

General charts 928, 2576, 943, 1263.

Plan of N. entrance of channel between Lapak, &c., on chart 2576.
Var. 1° 40' E.

of the town, is low and wooded; from it and Busbus point, further south, a coral reef extends westward for a quarter of a mile, and uncovers at low water. Northward and westward of this reef, at the distance of one cable from it, are two detached coral patches with depths of 2 fathoms; and beyond them a bank of $4\frac{3}{4}$ fathoms extends westward to the distance of half a mile from Tolen point. A detached bank of 2 cables' extent covered by $4\frac{1}{4}$ fathoms water, lies 6 cables to the north-west of Tolen point. Within the channel a bank of from $3\frac{3}{4}$ to $4\frac{3}{4}$ fathoms lies off the mouth of the river, midway between Tolen point and the town of Siassi, and extends half-way across the channel; another bank of $4\frac{3}{4}$ fathoms lies southward of it at $1\frac{1}{2}$ cables from the Siassi shore, and a small patch of $4\frac{3}{4}$ fathoms lies $3\frac{1}{2}$ cables north of the fort, and 2 cables from the shore. The general depths in the channel northward of Siassi are from 6 to 15 fathoms.

Western side.—Luangat point, the northernmost point of Lapak island, is of rock and steep-to, and may easily be recognised by a small hill inland close to it. Busluk point, half a mile westward of Luangat point, is readily distinguished from it by being formed of huge rocks, and also by its being quite separated from the mountain.

Alikan point (*Lat. $5^{\circ} 34' N.$, Long. $120^{\circ} 48' E.$*) lies east-south-east one mile from Luangat point; a shoal of $3\frac{1}{4}$ to $4\frac{3}{4}$ fathoms water extends 4 cables northward of this point; and another of $3\frac{3}{4}$ fathoms 2 cables to the eastward. South of Alikan point the Lapak shore is clean as far as a conspicuous beach opposite the town of Siassi.

Anchorage.—Vessels anchor in mid-channel abreast of the town, where there is a landing jetty: if intending to remain, vessels should moor. It is stated that the depth of water here is greater than shown, there being 10 fathoms abreast the jetty.

Directions for Siassi.—No particular directions are necessary for entering Siassi from the northward. Gorro peak on a S.E. $\frac{1}{4}$ E. bearing leads between the banks to the northward. After passing Tolen point on the eastern side of the entrance, from which foul ground extends about 4 cables, a mid-channel course should be steered. Sailing vessels should await a fair wind for entering.

Chart 928, Sulu archipelago.

The southern entrance, but half a cable in width, is fit only for small craft of light draught; the bottom is foul with large rocks, and the tide runs at the rate of 4 to 6 knots. For entering, a vessel in the offing should approach the passage between the reefs, steering for the most conspicuous house in the village of Manubol, on a N.N.W. $\frac{1}{2}$ W. course. In the northern part, where the channel divides into four passages, that immediately east of Taktagan islet, which is the deepest

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

and widest, should be taken. This entrance should not be attempted without a pilot.

Plan of N. entrance of channel between Lapak, &c., on chart 2576.

Siassi.—The town of Siassi is situated on the west coast of Siassi island, in the northern part of the channel that separates that island from Lapak, where there is a sheltered port of 3 cables extent and moderate depth. It is open to coastwise trade, but is of very little commercial importance. There is a military station, and the place is a telegraph station, being connected with Sulu by cable.

Supplies.—Fowls, fruit, and fish can be procured in small quantities; water can be obtained from wells at a short distance from the jetty.

Tides.—At Siassi it is high water, full and change, at 6h. 12m.: springs rise 9 feet. During the south-west monsoon the highest tide is in the morning; during the north-east monsoon the evening tide is the highest.

Tidal streams.*—From the 1st to the 4th of November, 1901, when the south-west monsoon was weak and with no unusual local winds, the tidal current ran strong through the strait from south to north during the ebb tide. The current during the flood tide was weak, setting from north to south. The directions of the currents are reported as being changed by heavy winds.

Tidal signals.—Upon the approach of steamers towards the channel leading to Siassi, a tidal signal is made at the end of the wharf:—A green flag indicates that the stream is running to the South. A red flag indicates that the stream is running to the North.

Telegraph cable.—The cable from Sulu is landed at the fort northward of the pier, and is laid in a north-north-west direction for $1\frac{1}{2}$ cables and then northerly through the channel.

Chart 928, Sulu archipelago.

Lapak (*Lat. 5° 32' N., Long. 120° 47' E.*), lying three-quarters of a mile westward of Siassi, is about 5 miles long in a north-east and south-west direction, and 3 miles in width. It has a conspicuous peak at the north extremity, 1,010 feet in height, and another near the southern end, 1,306 feet high, with a great dip between them, so that in the distance on a south-east bearing Lapak appears as two islands. A reef $3\frac{1}{2}$ miles long, north and south, lies close south-eastward of this island, and nearly joins the reef lying south-westward of Siassi.

One-third of a mile from the south-west point of Lapak there is a dangerous patch of rock, with a depth of 4 fathoms between it and the shore.

* From the U.S. Philippine Islands Sailing directions, 1906.

General charts 928, 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Manubol.—The island of Manubol near the south end of the Lapak reef has a large fishing village on its north-eastern side.

Anchorage.—There is good anchorage in depths of from 7 to 12 fathoms, sand and coral, south-westward of the small island, Pandami, on the west coast of Lapak, and immediately off Pandami village.

Supplies of bullocks, goats, and fowls may be obtained at Lapak at a moderate rate; vegetables are scarce. About 50 yards from the beach there is a well; it affords, however, but little water.

Selun, or Sirun, a small island covered with trees, lying $2\frac{3}{4}$ miles north-west of Lapak, is about a quarter of a mile long, 157 feet in height, and steep-to, with a clear channel between it and Lapak.

Tapaan (*Lat. 5° 28' N., Long. 120° 45' E.*), a low island south-west of Lapak, of semi-circular form with the concave side to the westward, is very narrow in the middle, being in some places only half a cable across; it stands on a coral reef that is dry at low water, with a small sand cay at the north end and an extensive one on the south side, curved towards the coast of Lapak.

The channel between Tapaan and Lapak islands is about $1\frac{1}{2}$ miles wide, and entering from the south, Selun just open of Lapak clears the reef off the south-east point of Tapaan; steering to the northward with this mark on until the south point of Lapak bears E.N.E., a course of N.W. by W. leads through the channel to the northward of Tapaan, but it crosses a bank with a depth of $4\frac{3}{4}$ fathoms on its southern end.

Tapaan passage, which is formed by Tapaan and Lapak to the eastward, and Bubuan and Maniakolat to the westward, is about 6 miles wide at its narrowest part, viz., between Maglumba, a small islet 123 feet high, off Maniakolat, and the north-west side of Tapaan. This passage is clear for a steamer, and would be convenient for a sailing ship, as the tidal streams running with a strength of 3 to 5 knots an hour make fairly through it, and in calms or light winds a vessel could always anchor to await the change of tide.

Crest of Wave shoal is in the fairway of the Tapaan passage, and the shoalest part, of $4\frac{1}{2}$ fathoms, lies about N.E. $\frac{1}{4}$ E. $4\frac{3}{4}$ miles from the little conical islet Parangaan, on the south-west side of the passage. It is composed of coral and sand, and is about $1\frac{1}{2}$ miles in extent within the depth of 10 fathoms; it can generally be discerned by the tide rippings round the edge of the shallow water, and by the discoloration of the sea.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Tapaan shoal, a patch of coral and sand lying nearly midway between Tapaan and Bubuan, is about one mile in extent, with a depth of $4\frac{3}{4}$ fathoms.

TAWI TAWI GROUP.—Parangaan, the north-easternmost of the group, is a conical islet, 90 feet high, clothed with light grass; about $3\frac{1}{2}$ cables westward of the island is a small flat-topped islet, 14 feet high, with a narrow 7-fathoms channel between the dry reef extending eastward from it and Parangaan.

Maniakolat (*Lat. 5° 27' N., Long. 120° 35' E.*) and Parangaan are connected by a bank, upon which are depths of 6 to 9 fathoms. Maniakolat is thickly wooded, about $1\frac{1}{2}$ miles in length north and south, and three-quarters of a mile wide; the peak of the island, 773 feet in height, shows from nearly every direction as a perfect cone. A small islet, 60 feet high, and wooded, lies nearly 4 cables west of the south-west part of Maniakolat.

Maglumba, situated about a mile eastward from the north-east point of Maniakolat, is an islet about $1\frac{1}{2}$ cables in length and 123 feet high; the southern side of it is foul to the distance of about 2 cables. There is a deep channel to the westward of this islet.

Bubuan island is about $2\frac{1}{2}$ miles long north-west and south-east, and from one to 2 miles in width, with a 3-fathoms channel, half a mile wide, between it and Maniakolat to the northward. Bubuan is covered with trees, and from the highest peak (457 feet) a chain of hills extends to the eastward, terminating at the north point.

On the west side of Bubuan is a shallow lagoon, with a bar nearly dry at low water; in this lagoon the numerous fishing prahus engaged dredging for pearl oysters south and east of this island seek protection from stress of weather.

Mid-channel bank.—A bank extending 7 miles in a north-north-west and opposite direction, covered generally by depths of 4 to 9 fathoms, but with rocks, both sunken and awash at high water near the middle of its eastern edge, and two patches of $1\frac{3}{4}$ fathoms on its southern part, is situated north-west of Maniakolat. The rocks awash lie S.W. $\frac{3}{4}$ W., distant about $2\frac{1}{2}$ miles from Parangaan islet. The northern sunken rock is stated to be awash at spring tides and in smooth water hardly discernible until close to; and the two $1\frac{3}{4}$ -fathoms patches are shown as shoals that dry on the Spanish chart. *See Anchorages, page 277.*

Kakataan island, situated west-north-westward $7\frac{1}{4}$ miles from Maniakolat island, though low and flat, is covered with trees, the tops of which are 105 feet above the sea; it is about a mile long in a north-

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

west and south-east direction, with a reef that dries extending 3 cables from its northern end. There is a coral patch of $3\frac{3}{4}$ fathoms at the distance of one mile to the southward of Kakataan, on a bank of 7 fathoms extending $2\frac{3}{4}$ miles in that direction.

A detached bank, with a depth of 6 fathoms, lies 2 miles south-westward of this island; and there are patches of 7 and 9 fathoms between the bank and Sigboyé island.

For tidal streams, *see* page 278.

Sigboyé island (*Lat. 5° 25' N., Long. 120° 24' E.*), 778 feet in height, and thickly wooded to the summit, lies about S.W. by S. 6 miles from Kakataan. It is fairly steep-to on the north side, but a rock with $1\frac{1}{2}$ fathoms over it lies three-quarters of a mile to the southward off the centre part of the island, with shoal water inside it.

Tambagaan island, the north-east point of which is W.S.W. $1\frac{1}{2}$ miles from the west point of Sigboyé, is about 3 miles long and $1\frac{1}{2}$ miles wide, with a conical green peak 726 feet in height near its east extreme. There is a deep channel with strong overfalls between Sigboyé and Tambagaan.

Off the south point of this island there are two small rocks or islets, and at the distance of 2 miles some patches covered by $3\frac{3}{4}$ to $4\frac{3}{4}$ fathoms of water; the rock nearest the island, 25 feet in height, is surrounded by reefs, the other rock, 8 feet high, lies half a mile south-westward of the former.

Good anchorage may be had southward of Tambagaan.

Simaluk and Kuad Basang.—The east point of Simaluk, which is the eastern and larger of these two islands, lies 4 miles north-west of Tambagaan island; these islands are similar in shape, being of horse-shoe form, with the concave sides to the eastward; the indentation in Simaluk is nearly filled up with numerous small islets.

Both are surrounded by a fringing reef, and between the two is a shallow coral patch three-quarters of a mile long north and south, on which the sea breaks heavily during the north-east monsoon. There is anchorage both east and west of this patch, but it is not recommended, as the anchorage south of Tambagaan, only 6 miles distant, is better.

The islands are wooded, similar in appearance, and the tops of the trees on Simalak are 127 feet above the sea.

There are no houses on either island, but the natives visit them in great numbers, the fishing ground inside the reefs being so good; at the approach of a boat or a steamer the natives take to the woods, and it is difficult to hold communication or obtain information from them.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Magpeos island (*Lat. 5° 20' N., Long. 120° 35' E.*), 4 miles southward of Bubuan, is an almost perfect cone, 418 feet high; a reef extends to the distance of about 3 cables east-north-east from the island, with a rock awash at the end of it.

Sigboyé passage is the deep channel about 4 miles wide, between Bubuan and Magpeos islands; its direction is west-north-west and east-south-east, and off its eastern entrance the currents are strong and irregular.

Tagao island, lying S. by W. about $1\frac{1}{4}$ miles from Magpeos island, has four small peaks, the highest of which, on the north-west extreme of the island, is elevated 270 feet above the sea. There is a deep channel between this island and Magpeos.

A sunken rock lies off the south point, and another with $1\frac{3}{4}$ fathoms on it lies one-third of a mile south-east of Tagao; a bank of 5 fathoms extends three-quarters of a mile in the same direction, and the island should be given a berth of a mile when passing it to the eastward.

Tankolaluan is a small coral islet lying 5 miles westward of Tagao; it is covered with trees, and about 107 feet in height.

At the distance of 2 cables west of Tankolaluan there is a small rock that seldom covers, on which the sea breaks heavily with strong north-easterly winds.

Pandanan, a small coral islet covered with trees and 90 feet high, lies about $3\frac{1}{2}$ miles westward of Tankolaluan. It is situated in the centre of a bank $1\frac{1}{4}$ miles long, north and south, on which the depths are 6 and 7 fathoms. A sunken rock lies a short distance northward of the islet. *See anchorages, page 277, and tidal streams, page 278.*

KINAPURAN GROUP, lying about 10 miles southward of Bubuan island, consists of the three low, densely wooded, coral islands Kinapuran, Bintoulán, and Tabawan.

The reef of Kinapuran extends $1\frac{1}{2}$ miles eastward from that island, and near Dangerous point, the outer extreme, there is a sand cay that dries 3 feet at low water.

Tabawan has several small islands and islets on the reef extending $1\frac{3}{4}$ miles south from it, and is separated from Bintoulán and Kinapuran, which latter islands lie on the same reef, by a 5-fathoms channel. There is also a clear channel between Tabawan and Loran, which lies to the westward of it.

As the reefs to the southward of these islands are steep-to, and the lead consequently gives no warning, care should be taken when navigating in this vicinity. The tidal streams here are also strong and irregular. Two miles south of the western islet of Tabawan, in

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

the corner of the reef, is a patch of rock that seldom covers except at very high tides.

Anchorage.—There is anchorage on the north side of Tabawan with the west extreme of the village of Tahing Tahing, bearing about S.S.E., three-quarters of a mile off-shore.

The tides here are regular, and not very strong.

Supplies.—The island of Tabawan is thickly populated, but Bintoulán and Kinapuran are only resorted to for fishing, this being the chief occupation of the natives, and upon which they depend principally for the means of subsistence. Numerous boats also leave Tabawan in the season for the pearl oyster banks. No provisions are to be obtained here except fish and cocoanuts, in small quantities.

Tidal streams.—At $1\frac{1}{2}$ miles northward of Kinapuran island the flood stream sets north-westward and the ebb south-eastward at the rate of 3 to 4 knots an hour.

Loran island (*Lat. 5° 12' N., Long. 120° 31' E.*), lying $3\frac{1}{4}$ miles westward of Tabawan, is $1\frac{1}{2}$ miles in length north-west and south-east, about 3 cables wide, and on the north-west side is 157 feet in height. The island is inhabited, and partly cleared and cultivated.

The northern point of Loran island is steep-to, but the remaining shores are fringed by coral reefs to the distance of from about 2 cables on the east and north-west sides to 6 cables on the south and south-west sides. On this reef, to the southward, are several small islets, and the little island of Manote.

South Ubian island, about three-quarters of a mile south-west of Loran, is triangular in shape, with the apex to the north-west; it is the best cultivated and most thickly populated of this group.

The island is surrounded by a coral reef extending from it to a distance of three-quarters of a mile on the east side, having several little islets upon it, the highest of which dries 8 feet at low water.

There is no passage, except for boats or small craft, between South Ubian and Loran. *See Anchorages, below.*

Tides.—It is high water, full and change, at South Ubian island at 6h. 15m.; springs rise 5 feet. For tidal streams, *see* page 278.

Anchorages.—There is fair anchorage off the north end of the channel between South Ubian and Loran islands in from 7 to 12 fathoms, sand, and on the bank east of Pandanan island in from 8 to 10 fathoms, sand. H.M.S. *Nassau* also anchored east of Kakataan in 10 fathoms, sand; and on the Mid-channel bank, between Kakataan and Bubuan islands, both to the south-west and north of the rocks awash, in depths of 7 to 8 fathoms, sand and shells.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

THE TABUAN GROUP, about $1\frac{1}{2}$ miles westward of South Ubian island, consists of a number of rocks and small islets, the largest of which, Tabuan, is inhabited.

The group lies on the eastern edge of Bukutkut bank, a large coral reef which stretches away north-westward 5 miles from Tabuan island with the Lihāt Lihāt rocks on the north-west extreme, and one mile southward, with numerous sand cays on it. In the centre of the bank there is a cluster of rocks 15 feet high; the Celandat islets are on the north-east edge, and Pomelean islet on the east edge of the bank. A detached patch, with a depth of one fathom, lies about 2 miles westward of Tabuan island, with a deep channel two-thirds of a mile wide between it and Bukutkut bank.

Pasegan (*Lat. 5° 14' N., Long. 120° 25' E.*) is a small low coral island 5 miles west-north-westward of the north point of South Ubian, covered with trees, the highest of which is 90 feet above the sea. It is fringed with a reef extending northward and eastward to the distance of 4 cables from the shore, with depths of 3 to 6 fathoms at the edge. At 6 cables north-west of the island is the narrow bank, with a depth of $3\frac{1}{4}$ fathoms, mentioned below.

Pasegan Guimba (not named on chart), situated $1\frac{1}{2}$ miles west of Pasegan, is very similar to it. A narrow bank, with 2 fathoms on it, extends more than a mile north-eastward from the islet, and north-west and south-east of the islet are banks, with depths respectively of 2 and $2\frac{3}{4}$ fathoms; that to the south-east nearly joins the Lihāt Lihāt rocks on the point of Bukutkut bank.

Tidal streams.—Between Sulade and Kakataan islands the flood stream runs to the north-west and the ebb north-east, at a moderate rate in the open channel, but very strong round the islands.

In the channels on either side of Mid-channel bank eastward of Kakataan, the flood stream sets nearly north and the ebb about south, at the rate of from one to 3 knots.

Off Pandanan the streams set about north-north-west and south-south-east, and at the anchorage northward of South Ubian the flood runs north-west and the ebb south-east, at the rate of from one to 2 knots.

South of Ubian, and between that island and the Tabuan group on Bukutkut bank, the streams run at the rate of fully 4 knots at springs round the edges of the reef, where their greatest strength is felt.

Supplies.—No supplies are to be obtained from the islands of the Tawi Tawi group. Wood may be cut on any of them for steaming purposes.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Vessels navigating these waters must be very cautious, as the natives are treacherous, and not to be depended on.

TAWI TAWI island, the principal of the group, is about 30 miles in length east-north-east and west-south-west, and 13 miles in maximum width at its eastern end. A range of mountains traverses its entire length; to the north-east, Mount Bujimba rises to a height of 897 feet; Mount Batua, eastward of Port Dos Amigos, is elevated 1,283 feet; near the centre of the island is a mountain, which culminates in four peaks, the highest of them with an altitude of 1,941 feet, named Tawi Tawi Summit, or Dromedary peak; and Thumb hill, near the western end of the island, is square-topped, and 736 feet high.

The appearance of the island is very varied, and presents a number of wooded tracts separated by spaces of bright green.

The north coast of the island has few outlying dangers, and affords several sheltered anchorages with convenient depths of water. The north-east coast is bordered by a chain of islands of moderate height which present anchorages for vessels passing between them. The south coast is also bordered by islands and reefs which extend from 5 to 15 miles to the south-east and south, leaving deep passages between them to the bays on the coast. The south-west coast, or south coast of Sanga Sanga and Bongao islands, is clean and steep-to.

The little isles that surround Tawi Tawi are sparsely inhabited, and have been generally regarded as refuges for pirates.

ISLANDS OFF the EAST COAST of TAWI TAWI.

—**Bas-Bas island** (*Lat. 5° 21' N., Long. 120° 14' E.*), situated off the north-east point of Tawi Tawi, from which it is separated by a channel about 4 cables wide, is low and covered with mangroves, with a hill about the middle of the western side 248 feet high. The island is steep-to and clean, except to the north-east and east, where there are several rocks at the distance of about half a mile from the shore; while off the south point rocks extend more than a mile south-eastward with several heads above water.

Panjumajan island lies one mile east of Bas-Bas, and has on its north-west extremity a hill 112 feet in height; it is surrounded by a narrow bank of sand, with a rock on a small shoal and two great rocks named Pamakalan and Pamagbaran, situated respectively 4 and 5 cables from the south coast. The bank extends three-quarters of a mile from the north-east side of Panjumajan, with a depth of $2\frac{1}{2}$ fathoms, and apparently continues almost to Tambagaan island with but one fathom increase of depth.

Tabulunga is separated from Tawi Tawi by a narrow and impracticable channel, with shores covered by mangroves, and has a depth

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

of 2 to 3 fathoms on its eastern side. This coast, and the banks which lie south-eastward of Bas-Bas island towards Dalumon island, form the continuation of the Bas-Bas channel, which is obstructed here by an islet, and a 3-foot bank having a rock on its northern end.

Bas-Bas channel, between Bas-Bas island to the eastward, and the north-east extremity of Tawi Tawi and Tabulunga island to the westward, is $2\frac{1}{2}$ miles long and 4 cables in width. The northern part of the channel is direct and clear, with depths of from $4\frac{3}{4}$ to 9 fathoms, but the southern part is narrowed by shoals, and the depth decreases, so that only small vessels can use it. In the northern part of the channel there is sheltered anchorage, with good holding ground, for vessels of any size; the sides are steep-to, but sand shoals extend out $1\frac{1}{2}$ cables from the entrance points.

Directions.—Bring the highest part of Bas-Bas island to bear S.E. and steer for it; when fairly in the entrance keep in mid-channel, and anchor when the highest part of Bas-Bas bears N.E., in 5 fathoms, sand. It is not advisable to go farther in, as the bottom is foul beyond this position.

Islets and dangers.—In the space extending over a distance of about 6 miles south-eastward from Panjumajan island and about 4 miles from the north-east coast of Tawi Tawi and Tandubato islands, are numerous islets, rocks, and shoals, with channels between them, for which the chart and eye are the only guides.

Tandubato island, separated from Tawi Tawi by an impracticable channel named Gallo Mallo, is somewhat pear-shaped, about 5 miles in length north and south, and $4\frac{1}{2}$ miles in width, tapering to the northward. A peak rises to a height of 528 feet from among a chain of hills on the north-eastern coast; the highest part of the island is a peak in the south-east part, which attains an elevation of 635 feet. The shores of the island are skirted by a labyrinth of reefs and islets. Taruk (*Lat. 5° 15' N., Long. 120° 19' E.*) is a low island about $1\frac{1}{2}$ miles in extent, almost joined to the north-eastern part of Tandubato; it is surrounded by shoals and islets, which extend $1\frac{1}{2}$ miles north-eastward and northward; those to the eastward form the western side of the channel Noche Buena. One of the islets on the north-east side, Nahuan, 182 feet high, is a mark for the Noche Buena channel; a shoal extends north-eastward from it, parallel to the coast of Kalupag.

Kalupag and Tigungun islands form the eastern side of Noche Buena, and the western side of Kalaitan channels, and together are $4\frac{3}{4}$ miles in length, north and south. They are separated by a narrow channel; they have several hills, the highest on Kalupag, the northern island, being elevated 590 feet above the sea; the southern

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

island, Tigungun, is 3 miles in length, and 425 feet in height. To the northward Kalupag is clean, with deep water near it, but the southern part of Tigungun is surrounded by reefs and islets, near which the general depth is $2\frac{1}{2}$ to $5\frac{1}{2}$ fathoms.

The Kalaitan islets lie on an extensive reef between the south-east coast of Tigungun and Bukutkut bank.

Little Kalupag (*Lat. 5° 16' N., Long. 120° 23' E.*), lying half a mile north-east of Kalupag island, has on its north-west and south-east extremities two conical peaks, 370 and 354 feet in height, respectively. The island is clean and its sides steep. The islet Bakiki, 40 feet high, with a sunken rock south-east of it, lies $3\frac{1}{2}$ cables from the north point of Little Kalupag. At about a mile north-north-east of the east point of the island is a patch of $2\frac{3}{4}$ fathoms, and a patch of 2 fathoms lies three-quarters of a mile south-eastward of the island. The channel that separates Little Kalupag from the north point of Kalupag is 5 cables wide, and is divided into two narrow deep passages by the little clean island Charuk.*

CHANNELS to the EAST of TAWI TAWI.—There are four channels between the islands and reefs that lie east of Tawi Tawi and west of Bukutkut bank; of the four, two only are navigable by vessels of any draught, these being Kamba or Lihāt Lihāt, and Noche Buena; the other two are foul, and of little depth.

Kamba channel, between Bukutkut bank to the east and Kalaitan reefs to the west, is 2 miles in length in a north and south direction, and one-third of a mile wide in the narrowest part, with a depth of 7 to 9 fathoms. To enter it from the northward, a vessel should pass between Kalupag and Pasegan Guimba, or between the two Pasegans; the latter route, however, seems suitable for light draught vessels only. This channel is considered preferable to that of South Ubian for vessels of good draught of water, but should not be attempted at night; the currents in it are very strong.

Kalaitan channel, between the edge of the Kalaitan islands bank and the south-east coast of Tigungun, is only practicable for handy vessels of less than 6 feet draught. The north entrance is divided into two arms by a shoal; the southern end joins the Kamba channel by the Sipungut channel, which runs east and west. The little channel north of Tandubas, between it and Hiag bank, is impracticable.

Noche Buena channel, between Kalupag and Tigungun islands on the east and Tandubato island on the west, allows a passage

* In the *Nassau's* survey Channel rock (not examined) is said to lie N.W. $\frac{1}{2}$ W. $8\frac{1}{2}$ cables from the north point of Little Kalupag.

Chart 928, Sulu archipelago. Var. 1° 40' E.

being made to the south of Tawi Tawi without leaving the archipelago, and without exposure to the sea of the open waters, which is sometimes very heavy during the south-west monsoon; it is practicable for vessels of 19 feet draught, and there is anchorage everywhere in it (*Lat. 5° 15' N., Long. 120° 21' E.*). It is 6 miles in length, and $3\frac{1}{2}$ cables wide in the narrowest part.

Directions for Noche Buena channel.—Coming from the north: when westward of and near to Little Kalupag a vessel should steer S.W. $\frac{1}{2}$ S. for a hill 282 feet high on the south-east part of Nahuan islet, and continue that course until a hill 590 feet high on the eastern part of Kalupag in line with a smaller one 476 feet high near the beach bears S.E. $\frac{1}{4}$ S.; she should then steer S. by W. $\frac{3}{4}$ W. and pass in mid-channel between a narrow bank westward, covered by 13 feet on the northern end, and 3 feet on the southern, and a rocky shoal covered by 10 feet, eastward, until abreast of the little verdure-clad islands Tampatampa and Gandol, which must be passed close to. The vessel should then steer S.W. $\frac{1}{4}$ S. for the hill 635 feet high on the south-east coast of Tandubato island, and continue this course in mid-channel until arriving between the islet Sinagbuan to starboard and the islet Sibalok to port, and then turn to the south, passing at one cable to the eastward of a remarkable and clean rock north-east of Tambiluanga island and close to it.

From this rock the course is S. 9° E. to pass midway between the Ambilon and Kasapaan shoals, in depths of $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, with some patches of $4\frac{1}{2}$ fathoms, which can be avoided by borrowing somewhat eastward, where the water is deeper; then the passage is to the west between the islets Plus and Ultra into the great bay south of Tawi Tawi. The channel between the islets is narrow and the least depth 4 fathoms. Another passage practicable for small vessels is north of Plus and Pintada islets, which lie on the same bank.

Caution.—It is not prudent to pass between the islands Plus and Ultra facing the sun when low; at other times the banks can be distinctly seen, and no mistake should be made with attention to the chart.

Water.—On the south-east part of Tambiluanga island, situated off the east point of Tandubato, there are three wells of good water, but the supply is not great.

Gallo Mallo channel, between Tandubato and the east coast of Tawi Tawi, can be navigated by small craft. The sides of the channel are high and covered with lofty trees. Many creeks open into it, and the important town called Mapait by the natives is said to be in this locality.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago.

ISLANDS SOUTH OF TAWI TAWI.—The islands Tandubas, Sekubun, and Lataan or Latuan, occupying a space 9 miles in length north-east and south-west, are low, and lie so close together that they generally appear as one island; they are inhabited and cultivated in the interior, with wooded coasts. The outer edge of the reef on which these islands are situated is distinct, and very steep, there being no bottom with 114 fathoms at a cable's length from it.

The passage between Tandubas and Sekubun is only fit for light native craft; the channel between Sekubun and Lataan, called Paragua channel, may be used; it is narrow, tortuous, and deep; the edges of the reef can always be seen from aloft.

Mantabuan and Banaran (*Lat. 5° 2' N., Long. 120° 7' E.*) are two flat islands united by a reef, on which near the middle is a small islet, Sasa. Mantabuan is inhabited, but Banaran is not. In the channel between Mantabuan and Lataan the depth is $4\frac{3}{4}$ fathoms; the edge of Mantabuan reef shows clearly, and is steep-to, but the western end of Lataan reef is more shelving and not so easily seen. To enter this channel from seaward, steer in midway between Mantabuan and Lataan reefs on the course N.W. $\frac{3}{4}$ W., when a small sand-bank named Circe, that generally uncovers, may be seen ahead.

The channel west of Banaran is wider and has a depth of 7 fathoms in the centre; it can be navigated by keeping midway between the edges of the reefs.

Basibuli reef, with Basibuli islets in the centre, some smaller islets to the south-west, and Panampanang islet on the north-east end, uncovers at low water; the reef is of sand and coral, and steep-to. The channel westward of the reef is clear and deep.

Tawi Tawi bay.—The interior of this great bay is filled by banks and shoals, with navigable channels between them, too numerous and intricate to describe, in which the depths are from 8 to 13 fathoms. By piloting from the masthead, and with the aid of the chart, the navigation is easy; but the sun should be at a good altitude and behind the pilot. It is also essential that the vessel shall be handy, as many of the turns in the channels are very sharp.

Plan 1243, Bongao anchorage.

Balambing, a town on the south coast of Tawi Tawi, was destroyed by a Spanish squadron in 1871. The people were pirates when opportunity offered, taking and enslaving the crew of any trading prahu weaker than themselves. This was formerly the great boat-building establishment for nearly the whole of Tawi Tawi, but since the visits of the Spanish gunboats they have removed about 2 miles to the north-east.

General charts 1868, 928, 2576, 943, 1263.

Chart 928, Sulu archipelago.

Buan island is in the great bay north of Balambing, and near the coast of Tawi Tawi. It is 397 feet in height, well cultivated, and has good water; there is a remarkable tree on the centre of the island. Large vessels can anchor about 2 miles south of Buan in a depth of 10 fathoms, while vessels of lighter draught can anchor north of it in 4 to 5 fathoms.

Plan 1243, Bongao anchorage.

Lupa island, eastward of Balambing, is separated from Tawi Tawi by an impracticable channel.

Bilatan island and Bilok Bilok bank.—Bilatan is an island about $3\frac{1}{2}$ miles long, north-east and south-west, standing on the eastern side of the great Bilok Bilok bank that runs south from Tawi Tawi island. There appear to be some large villages in the interior of the island, and judging from the number of boats passing between it and Tawi Tawi and the islands to the south-west, there is a considerable traffic carried on between them.

From the southern end of Bilatan the coral reef, from 2 to $3\frac{1}{2}$ miles in width, with a chain of small islets and sand cays upon it, known as the Tiji Tiji islets, extends $8\frac{1}{2}$ miles to the south-west; one of the largest islets, Tumbukan, has a huge tree in the centre of it. Tiji Tiji bank, with a sand cay near its edge, forms the south-west end of the reef.

Balambing channel separates Bilok Bilok bank from the coast of Tawi Tawi; vessels using the channel are recommended to keep on the coast side, but the channel off Balambing point has been reported to carry a depth of 2 fathoms only.

On the north-west point of Bilok Bilok bank, about one mile south of the town of Balambing, are two small flat-topped rocks 12 feet in height, named Dulang-dulang, from which the reef dries eastward upwards of 3 miles, dotted here and there with little black boulders. The reef also trends southward from the Dulang-dulang rocks for about 5 miles, then curves south-westward to its south-west end.

Simonor and **Manuk Manka** are the two largest off-lying islands to the southward of Tawi Tawi. Simonor, about $4\frac{1}{4}$ miles long, north and south, and $3\frac{1}{2}$ miles broad, is situated nearly $1\frac{1}{2}$ miles westward of Tiji Tiji bank; it has a fringe reef of coral round it, which is steep-to, with no anchorage round its coast. There is a shallow lagoon with its entrance on the north-east side of the island, in which native prahus take refuge on the approach of danger.

Manuk Manka (*Lat.* $4^{\circ} 49' N.$, *Long.* $119^{\circ} 50' E.$), lying $1\frac{3}{4}$ miles southward of Simonor, is nearly 4 miles long, east and west, and $1\frac{3}{4}$ miles broad; it has a fringe reef nearly all around it, and is also

General charts 1868, 928, 2576, 943, 2660b, 1263.

Plan 1243, Bongao anchorage. Var. 1° 40' E.

steep-to. There is a deep channel between these islands, as well as between Simonor and the islets and reefs north and east of it. There are several towns on Simonor, and both it and Manuk Manka are well populated.

Laa island, of coral formation, and covered with trees, the highest being 116 feet above the sea, lies about $1\frac{1}{2}$ miles from the cay on the north end of Tiji Tiji bank.

Sanguisiapo, about 2 miles west-north-westward of Laa island, is a small low coral islet, with a few straggling bushes on it, standing on a coral reef about $1\frac{3}{4}$ miles in length, that runs in a west-north-west and opposite direction; this reef is steep-to eastward, but from its west end a bank of sand and coral extends west-north-west $1\frac{1}{2}$ miles to its 5-fathoms limit. There is also a patch of rocks and a rock awash about one mile N.W. by N. from the highest bush on the island.

Danger.—Between Laa island and Sanguisiapo there is a dangerous coral reef about a quarter of a mile in extent, and north-westward of this and about in mid-channel a small 3-fathoms bank.

Directions.—If bound to Balambing from the southward and eastward, the north sandy point of Manuk Manka should be steered for until the west end of Laa island comes in line with a remarkable cliffy hill on Tawi Tawi island called Thumb hill (736 feet), bearing N. 4° W., which leads nearly mid-channel between Simonor and the Tiji Tiji bank; when near Laa island haul to the north-east, passing it at the distance of 2 or 3 cables.

Sanga Sanga island is about $6\frac{1}{2}$ miles in length in a north-east and south-west direction, and $3\frac{3}{4}$ miles across at the widest part; it lies immediately westward of Tawi Tawi island. This island is not high, has no conspicuous hill on it, and is covered with trees. There are a few small patches of cultivation on the south-east side over Pandan bay, but there are none in any other part of the island.

The channel between it and Tawi Tawi is $4\frac{1}{2}$ miles long and from $1\frac{1}{4}$ cables to one mile wide; it is shallow, tortuous, and only available for boats or prahus of light draught; it is marked by beacons, and its entrance from the northward is almost hidden by Trusan Bongao island (Takut Mataha) and reefs. The least depth between the southern entrance and Simanale anchorage is $1\frac{1}{4}$ fathoms.

Simanale anchorage (*Lat. $5^{\circ} 7' N.$, Long. $119^{\circ} 49' E.$*) is in the northern part of the passage that separates Sanga Sanga from Tawi Tawi. Trusan Bongao island shelters and almost conceals the northern entrance of this channel, which is but half a cable in width between the shoals on either side, with a least depth of $3\frac{3}{4}$ fathoms. Within the entrance the port widens to 8 cables, but shoals on either

General charts 1868, 928, 2576, 943, 2660b, 1263.

Plan 1243, Bongao anchorage. Var. 1° 40' E.

side as well as in the middle greatly reduce the available space, which is about a quarter of a mile in extent, with a depth of nearly 5 fathoms in the middle; vessels drawing over 16 feet should moor.

Plan of Port Bongao on chart 2576.

Bongao island.—This island, the most western of the Tawi Tawi group, is nearly $2\frac{3}{4}$ miles long by about $1\frac{1}{2}$ miles in breadth; Mount Vigia, its highest peak, is elevated 1,151 feet above the sea, and there are several others of considerable altitude. All these peaks are cliffy to the northward, and present a curious appearance on some views from that direction, the summit of the island having apparently been broken up by volcanic agency. With the exception of these cliffs, the whole island is densely wooded, the jungle being impenetrable for more than a few yards, and uninhabited, except by a few refugee slaves from Tawi Tawi. Bongao is separated from Sanga Sanga by a very narrow passage named Trusan Bongao, suitable only for small craft of light draught. It is reported that there are not less than 2 fathoms in this passage.

Papahag island lies south of Sanga Sanga, and east of Bongao, and is separated from each by narrow channels, the former having a least depth of 8 fathoms, and the latter of $3\frac{3}{4}$ fathoms. The south-west side of this island is well planted with cocoanut trees, but it does not appear to be thickly inhabited.

Foul ground extends south-eastward half a mile from the south-east side of Papahag island, at the outer extremity of which the depth is three-quarters of a fathom, and depths of $3\frac{3}{4}$ and $6\frac{1}{2}$ fathoms extend half a mile further in the same direction; a patch of $2\frac{3}{4}$ fathoms lies one cable south of Matos point, the south end of the island; and a coral patch of 3 fathoms is situated 4 cables west of Matos point, between which and the south-west shore, fringed with a coral reef, there are three large coral shoals with depths of $1\frac{3}{4}$ to $2\frac{3}{4}$ fathoms.

Port Bongao (*Lat. 5° 2' N., Long. 119° 47' E.*) is formed by the islands Sanga Sanga, Bongao, and Papahag.

Numerous reefs contract the anchorage space to a basin about 3 cables in diameter, having a depth of about 6 fathoms in the centre. There is at present a constabulary post on the west side of a rocky point making out from the north-east point of Bongao island, from the end of which a reef, partly dry at low water, projects into the channel. There is a wharf immediately inside the point that is said to have 10 feet of water at the end at low water.

Bongao is a port of little commercial importance, and few vessels are seen there except an occasional government steamer.

General charts 1243, 1868, 928, 2576, 943, 2660b, 1263.

Plan of Port Bongao on chart 2576. Var. 1° 40' E.

Supplies.—No water or stores of any kind are obtainable. There is a small supply of coal belonging to the government.

Directions.—Vessels bound into Port Bongao generally use the southern channel. Keep Thumb hill open eastward of Papahag island, which leads south-eastward of the shoals extending from Martinez point, and when the middle of the channel between Bongao and Papahag islands bears N.W., steer for it; pass the reef off the north-east point of Bongao close-to and round it sharply if bound to the wharf.

Tides and tidal streams.—At Bongao it is high water, full and change, at 6h. 40m.; springs rise 6 feet. The flood stream sets north-west and the ebb to the south-east, at the rate of 2 to 4 knots an hour; but it takes many directions round the reefs; southward of Bongao and between Simonor and Sanguisiapo it runs like a race with whirls and heavy overfalls, even in a calm.

Chongos anchorage (Pandan bay).—On the south side of Sanga Sanga is a snug anchorage, well sheltered from all winds, with good holding ground; vessels going close in should be careful to avoid the rock awash and the 6-foot coral patch in the middle of the entrance. The best anchorage is, however, outside the bay, in a depth of 12 fathoms, mud, with the east tangent of Papahag bearing S.S.E. $\frac{1}{2}$ E., and south point of Sanga Sanga W.S.W.

Vessels bound into this anchorage or into Port Bongao by the channel north of Papahag, should not bring Thumb hill to bear eastward of N. 37° E. until Matos point bears West, to avoid the reef extending south-eastward from Papahag island.

Supplies.—There are no supplies to be obtained, the few people residing here living on the few fish they catch.

Plan 1243, Bongao anchorage.

Tangao is a small islet covered with trees, distant about $1\frac{3}{4}$ miles E. by N. from Papahag island and 4 cables from Tawi Tawi; there is a reef projecting half a cable to the southward of it, the extreme of which dries at half ebb.

A rocky point on the southern shore of Tawi Tawi island, off which a reef extends $2\frac{1}{2}$ cables, lies $1\frac{3}{4}$ miles eastward of Tangao; and a detached reef that dries 2 feet lies about three-quarters of a mile eastward of the above rocky point; from this to Lubukan there are no off-lying dangers.

Lubukan island (Lat. $5^{\circ} 4' N.$, Long. $119^{\circ} 55' E.$), $5\frac{1}{2}$ miles eastward of Tangao, is moderately elevated, and is connected to Tawi Tawi by a reef dry at low water. Between this and Balambing point is a deep bight with the island of Samanput, 276 feet in height, in

General charts 1243, 1868, 928, 2576, 943, 2660b, 1263.

Plan 1243, Bongao anchorage. Var. 1° 40' E.

the middle, to the westward of which there is anchorage in a depth of 9 fathoms, mud.

Anchorage.—There is good anchorage anywhere along the south coast from Bongao to Balambing in about 13 fathoms, sand and coral, muddy bottom being sometimes obtained to the west and south-west of Lubukan island, where the holding ground is good. There is also good anchorage in both monsoons on the Sanguisiapo bank in a depth of from 6 to 10 fathoms, sand, but there is none southward of a line drawn between the north end of Simonor and the sand cay on the north end of Tiji Tiji bank.

Supplies.—When anchored north of Laa island in H.M.S. *Nassau* in 1872, the natives of Simonor came off with fowls, goats, cocoanuts, sweet potatoes, and fish, which they bartered for tobacco, knives, razors, buttons, &c., at a moderate rate. They only appreciated money as enabling them to make ornaments for their weapons.

Chart 928, Sulu archipelago.

Winds.—On the coast of Tawi Tawi and at the anchorage south of Bongao, the following winds have been experienced:—During the months of February and March, the winds were from N.N.E. to N.E., with occasional calms, and light airs from the northward; the squalls from N.E. blew very heavily at the anchorage south of Bongao.

During April and the early part of May it still blew fresh from the N.E., but after the 6th May calms and light airs were experienced until the end of the month, when it began to blow steadily from E.S.E. to S.E., force one to 3; these south-east winds prevailed in the Sulu sea until July.

Weather.—Heavy showers were experienced in January and February, with misty weather; March and April were finer, but the weather was still misty; May was almost free from rain, with the exception of an occasional passing shower, the atmosphere being generally clear; in June it was clear between the passing showers, which were, however, very heavy and frequent.

Chart 1868, Taganak to Tawi Tawi.

TATAAN or SIMALAK ISLANDS consist of a chain of nine small islands or coral reefs, extending for 8 miles north-east and south-west, nearly parallel to the north-west coast of Tawi Tawi, leaving between it and them a clear commodious channel from 4 cables to 2 miles wide, which forms the Tataan pass (*Lat. 5° 11' N., Long. 119° 55' E.*).

The two small, narrow, Simalak islands are the most easterly of the group; they lie close together, and are covered by high trees

General charts 1828, 928, 2576, 943, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 40' E.

visible at the distance of 12 miles. **Kabankauan** island lies three-quarters of a mile to the south-west; and consists entirely of mangroves on a flooded reef. These three islands rest on a coral reef which almost dries at low water, and which extends half a mile north-east of the smaller **Simalak**. On the northern part of the reef there is a bank of sand and gravel, visible 4 miles off, which serves to indicate the reef; another bank on the north-west part is generally covered.

Nusa Lajit and Nusa Takbu are two wooded islands lying three-quarters of a mile west-south-west of **Kabankauan**. The reef they stand on is separated from those on each side by navigable channels, known as the **Nusa Takbu** channel, eastward, and **Basun** channel, westward; the reef extends nearly one mile northward of the islands, and has on its north-east end a sand cay, which marks the western edge of the **Nusa Takbu** channel. South-eastward of the islands the reef extends 2 cables, and has off it a chain of coral patches extending 2 cables farther out, and from one channel to the other, making the approach dangerous.

Basun and Tinakta islands.—The Basuns are two wooded islands which lie half a mile west of the **Nusa** islands. **Tinakta**, which is covered by tall trees, lies one mile south-west of the Basuns, and on the south-west extreme of the reef on which these three islands stand. The reef, which is of sand and coral, with mangrove islets on it, reaches more than half a mile to the north and north-west, and is steep-to; on the northern part there is a cay of broken coral of a glistening white, and visible at the distance of 4 miles; this cay marks the western edge of the entrance to the **Basun** channel. South-eastward of the Basuns the reef runs out in two points to a distance of half a mile.

Plan 1243, Bongao anchorage.

Sipayu (*Lat. 5° 9' N., Long. 119° 52' E.*), the westernmost of the **Tataan** chain, lies $2\frac{1}{2}$ miles S.W. by S. of **Tinakta**, and 4 cables from the coast of **Tawi Tawi**, from which it is separated by a clear channel in which the depth is 6 fathoms. The island is of clean sand, and stands in the centre of the southern edge of a coral reef two-thirds of a mile in length east and west, from the western side of which shoal water extends a quarter of a mile west-north-westward. On the western end of the reef is a cay of sand and coral, which serves to mark it.

The channel between **Sipayu** and **Tinakta** is of uneven depth, and has several shoals in it with very little water over them; bottom, sand and coral.

General charts 1868, 928, 2576, 943, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 40' E.

Coast.—Bakun point, at the eastern entrance of Tataan channel, is a low prominent point covered with tall trees, and surrounded by a reef about half a cable in extent. Two miles to the eastward is the little bay of Moko, and midway between it and Bakun point a noticeable beach—the rest of the shore consisting of mangroves.

Tataan (*Lat. 5° 11' N., Long. 119° 56' E.*).—From Bakun point the coast trends west-south-west for $1\frac{1}{2}$ miles to the next point, including a slight indentation at the mouth of the Bakun river; from this point, which is opposite Kabankauan island, and is clean and steep-to, the coast trends first south-south-west for about 2 miles towards the bottom of a bay with two small shoals in it, which uncover at low water, and then westward one-third of a mile to the settlement of Tataan. The settlement is on a small hill, and consists of a fort and a few houses.

Anchorage.—The best anchorage is in a depth of 9 to 11 fathoms with the mole in line with the fort; further to the westward the depth is 14 fathoms and is a better berth for large vessels. The anchorage is exposed to the gales from south-west and north-west which blow in the months of June and December, when a sea sets in; vessels can then anchor to the eastward of Kabankauan, where there is shelter from all winds. During strong south-west winds a heavy sea sets up Tataan pass, and at such times a good anchorage can be found eastward of Bakun point, about a quarter of a mile off-shore, in 8 fathoms, sand and shells.

Tides.—It is high water, full and change, at Tataan at 6h. 48m.; springs rise $4\frac{1}{2}$ feet; the tidal streams are weak inside the islands.

Supplies.—None can be obtained here, except fish and water; an unlimited supply of fresh water may be obtained by vessels carrying at least 300 feet of hose.

From the settlement the coast, which is thickly wooded, trends west-south-westward for about 3 miles to a bay almost closed by a coral reef; it then curves westward for nearly 3 miles more, to Bugut Lapit point, and is low, wooded, and fringed by a reef that extends out about one cable.

Directions.—The north-eastern channel, between Bakun point and the Simalak islands, is the best; it is over three-quarters of a mile in width and has a depth of 12 fathoms in the middle, decreasing on either side. Within, the channel widens to 2 miles, and the depth increases in the middle to 17 fathoms. A vessel making for the Tataan anchorage should bring the fort to bear S. $\frac{1}{4}$ W., and steer for it on that bearing in order to pass westward of the two shoals before mentioned.

General charts 928, 2576, 943, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 40' E.

The Nusa Takbu channel, between Kabankauan and Nusa Takbu, is a quarter of a mile in width, with a depth of $4\frac{3}{4}$ to 7 fathoms; and runs north and south in a direct line with the settlement of Tataan. Vessels using this channel can keep a mid-channel course while northward of Nusa Takbu; but after passing that island the reef of Kabankauan, which is steep-to, should be closed in order to avoid the shoals extending south-east of the Nusa Takbu reef.

Basun channel separates the Basun and Nusa Takbu reefs; its northern entrance is marked by the cay of broken coral already mentioned; the southern part of the channel is dangerous on account of two shoals of 6 and 13 feet off the extremity of Nusa Lajit reef; in taking this channel it is therefore better to keep on the western side. The channel is narrow, but deep and clear.

Plan 1243, Bongao anchorage.

Western channel, between Sipayu and the coast.—In this channel there are two small banks, one of $3\frac{3}{4}$ fathoms situated one cable northward of the extremity of the coast reef; the other, of $4\frac{1}{4}$ fathoms, lying 2-cables from the coast in front of the little bay to the eastward of Bugut Lapit point. Between these shoals and Sipayu islands there is a clear channel a quarter of a mile wide, with depths of 6 to 16 fathoms. The southern shore of Sipayu is clean; it is better, therefore, to keep on that side of the channel.

Chart 928, Sulu archipelago.

Port Dos Amigos is situated 7 miles north-eastward of Bakun point. The entrance between Points Tokanhi and Lamnuyan, both of which are clean, is half a mile wide; thence the port runs in to the southward for about 6 cables, and then turns to the north-east for about a mile with a width of $1\frac{1}{2}$ cables, the depth diminishing from 11 fathoms at the entrance to 8 fathoms at the turning, and to 5 and 3 fathoms at the bottom of the port. The best anchorage is off the turning in 8 fathoms, sand and mud. There is a good watering-place in the port.

Shoal.—There is a shoal of $4\frac{3}{4}$ fathoms in the approach to Port Dos Amigos, situated about three-quarters of a mile north-west of Tokanhi point.

PANGUTARANG GROUP.—Pangutarang island (*Lat. 6° 17' N., Long. 120° 33' E.*), 10 miles in length north and south and the largest of the group, situated about 24 miles north-west of the west end of Sulu island, is low and level, little more than the trees showing above water. It is thickly inhabited, and carries on a brisk

General charts 1868, 2576, 943, 2660b, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

trade with Sulu. The principal place, Maglakob, lies on the east side, some distance inland. The coast near it is enveloped by coral and sandbanks, between which there is an entrance at high water into the lagoon formed by the coast and the reefs. The island is steep to on the south side, which appears to be the only part examined. The island contains numerous cocoanut trees, the milk from which is used by the natives instead of water, which in the hot season is very brackish, and during the rainy season nearly black. Strong currents are reported to exist between this group and Taganak island.

Pandukan is an island east of Pangutarang, $6\frac{1}{2}$ miles in length north and south; like the rest, it is covered with trees, a conspicuous peaked clump at its south end being the highest. The passage between Pandukan and Pangutarang is about $2\frac{1}{4}$ miles in width.

Kulassun (Kulassein), about 4 miles north of Pandukan, is joined to it by a chain of black rocks on a bank of white sand. Over these rocks are depths of one to $1\frac{1}{2}$ fathoms, and between them of 3 to 4 fathoms; two islets are shown on this bank. Northward of Kulassun, and at the distance of about $8\frac{1}{2}$ miles from it, two small islands surrounded by a reef are charted; the existence of these islands is doubtful. The U.S.S. *Annapolis*, passing 4 miles northward and one mile southward of the given locality, October, 1901, did not see the islands, though the weather was favourable, and position of ship well fixed. H.M.S. *Rinaldo*, in 1902, passed close to the position, but nothing was seen of the islands.

Caution.—Large vessels should not try to pass between the islands north-east of Pangutarang; the vicinity has been very imperfectly examined, and the tidal streams run at the rate of 6 knots at springs.

Tubigan, lying 3 miles east-north-east from Kulassun, is a small wooded island with a stream in which there is good drinking water.

Teomabal island (*Lat. 6° 20' N., Long. 120° 51' E.*), $2\frac{1}{2}$ miles in length east and west, lying 9 miles eastward of the north end of Pandukan, is low and wooded; a bank extends 6 miles east-north-east from the island, upon which the depth is 6 to 10 fathoms. In the centre of the passage between Teomabal and Tubigan, $7\frac{1}{2}$ miles apart, the depths are from 7 to 20 fathoms, coral and sand.

Teomabal bank, of 5 fathoms, is situated 7 miles east-north-east of the island of that name, and is separated from the bank extending in that direction from the island by a deep channel one mile in width. Two miles further east-north-eastward there is another bank with depths of 7 to 9 fathoms.

About $2\frac{1}{2}$ miles north of Teomabal detached bank, at the distance of 9 miles N.E. $\frac{1}{2}$ N. from the east point of Teomabal island, there is a

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

patch of $1\frac{1}{2}$ fathoms on the south-west end of a shoal with depths under 5 fathoms and about 2 miles in extent. Depths of 8 and 9 fathoms continue for 5 to 6 miles northward, and similar depths are found from 6 to 7 miles north-westward of the $1\frac{1}{2}$ -fathoms patch.

Pantokunan has been described with the Sulu group See page 264.

Pangutarang passage is the channel between Pangutarang island to the north, and North Ubian and Usada islands on the south; it is 5 miles in width and very deep. North Ubian and Usada are the largest of the group of thickly wooded islands lying to the southward of Pangutarang.

North Ubian, about 3 miles long, east and west, $2\frac{1}{2}$ miles wide and 74 feet in height, is inhabited, the largest town Suang-bunah being on the south-west side, in a deep bight, well protected by a coral reef. There is another village in the interior named Alo, not visible from the sea.

From North Ubian a bank, with from 6 to 12 fathoms over it, extends west-south-westward for nearly 19 miles to Cap island. This bank affords a good stopping place for a ship taking the Pangutarang passage; its northern edge is very steep.

Malikut (*Lat. 6° 6' N., Long. 120° 25' E.*), a small island south-west of North Ubian, distant about 3 miles, is a little more than half a mile long by a quarter of a mile wide.

A reef extends a quarter of a mile to the north-west, dry at low water, and is continued by a bank in the same direction, the 5-fathoms limit of which is about $1\frac{3}{4}$ miles from the north-west extreme of the island.

Anchorage.—There is anchorage between Malikut and North Ubian in depths of from 5 to 10 fathoms, but the bottom is hard and smooth. The *Nassau* anchored 5 cables south of the rocky islets at the entrance of the creek on the south-east side of Usada, in 11 fathoms, sand and coral, in fair holding ground.

There is also anchorage about 2 miles westward of Malikut, in a depth of 7 to 9 fathoms, but the tides run strong at springs.

Tikul lies about three-quarters of a mile eastward of North Ubian, with a deep channel between; it is 87 feet in height, about three-quarters of a mile long, and off its north end are two sand cays, with trees on them, and immediately south of this point is a lagoon of salt water. A sunken rock lies about 2 cables north-north-east of the north point. There are paths through this island, all converging to a well near the centre; the water, however, is brackish, but it is said that the natives of North Ubian come here for water.

General charts 2576, 943, 1263.

Chart 928, Sulu archipelago. Var. 1° 40' E.

Usada (Lat. $6^{\circ} 7' N.$, Long $120^{\circ} 33' E.$), 3 miles east-south-east of Tikul, is fringed by a reef; there is a lagoon on the western side of the island, with an opening into the sea through the reef, through which native boats pass at high water. Usada appears to be well inhabited from the number of canoes and prahus seen, but no towns are visible from the sea.

Kunilan, the tops of the trees on which are 67 feet above the sea, lies about $1\frac{1}{2}$ miles south-west of Usada, with a passage between the two islands; the island is about one mile in length in a north-west and south-east direction and half a mile broad.

Bas Bas, lying about $2\frac{3}{4}$ miles south-south-west of Kunilan, is covered with trees, the tops of which are about 63 feet high. Foul ground extends half a mile north-eastward from the north end and the same distance south-westward from the south side of the island.

All the low islands of this group appear to have been coral reefs or sand cays originally, as the surface of the soil is not much above the high-water level of extraordinary spring tides.

Laparan island, situated 23 miles west-south-westward of Malikut, is $5\frac{1}{2}$ miles in length north-north-east and south-south-west, from $1\frac{1}{4}$ to 3 miles in breadth, and covered with trees. To the westward it is fronted by a coral reef with several small islets on it, the reef being steep-to. There is no anchorage off the west side of Laparan.

A coral bank, $1\frac{1}{2}$ miles in breadth, extends 4 miles east-south-eastward from the middle part of the east side of Laparan, on the outer end of which is the island of Deoto Bato; depths of $4\frac{1}{2}$ and 5 fathoms are shown on the centre part of this bank. This locality is absolutely unsurveyed.

Chart 1868, Taganak to Tawi Tawi.

Dok Kan island, $2\frac{3}{4}$ miles in length, east and west, is separated from the south-west end of Laparan by a channel about a quarter of a mile wide. In the centre of this island is a large lagoon with several islets in it. A bank with a depth of from 5 to 8 fathoms extends about 2 miles north-westward from Dok Kan.

Anchorage.—There is anchorage south and north-west of Dok Kan, but none north of its eastern part; outside the 20-fathoms limit the bank is steep-to. On the southern side of the island a vessel should anchor directly the depth of 9 or 10 fathoms is obtained, as deeper water may be found between those soundings and the edge of the reef.

Tides and tidal streams.—It is high water, full and change, at Dok Kan, at 6h.; springs rise 5 feet. The observations were made

General charts 928, 2576, 943, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 40' E.

at the time of the equinox, when there was only one tide in the 24 hours, and the flood stream ran for 9 hours and the ebb for 3 hours ; the flood setting north-north-west, ebb south-west, at the rate of 3 to 5½ miles an hour.

Chart 928, Sulu archipelago.

Billanguan island (*Lat. 5° 42' N., Long. 120° 14' E.*), 18½ miles south-east of Dok Kan, is about three-quarters of a mile in length north-west and south-east, and like the majority of the islands in this locality, is low and covered with trees. It is surrounded by coral reef to the distance of nearly half a mile, and a detached patch lies one mile west-north-westward from its north extreme.

A bank with about 9 to 12 fathoms over it extends nearly 3 miles to the southward of this island, where a vessel may anchor if necessary, but the holding ground is not good.

Bambannan, another low coral island covered with trees, lies about 4 miles south-east of Billanguan ; it is only visited by the natives of Tawi Tawi occasionally for fishing purposes ; off the south side there is anchorage in about 13 fathoms, during the north-east monsoon.

Uwaan, Mamanuk, and Lahat Lahat, lying to the north-east of Billanguan and Bambannan, are similar to those islands in formation and character.

Caution.—The other islands included between North Ubian, Lapanan, and Bambannan have not yet been surveyed, and vessels should not pass between them.

Tablas shoal.—A shoal with a depth of 5 fathoms over it was reported in 1904 by the s.s. *Tablas* to exist 1½ miles S. 34° E. from the north-east point of Datu Bato. Similar depths were obtained for a distance of 2 miles on a N. 73° E. course from that position, after which the depth increased to 6 and 7 fathoms.

Depths of 4 to 12 fathoms have been reported between Datu Bato and Sipang islands.

Chart 1868, Taganak to Tawi Tawi.

The Pearl bank.—This extensive bank, on which are Taja and Zau islets, situated about 10 miles westward of Dok Kan, is a formation of coral and sand, lying about east-north-east and west-south-west, 15 miles in length, with an average width of 7 miles, and is very steep-to. Nearly in the centre of this is a circular coral reef about 18 miles in circumference, which dries in patches at low-water spring tides. The opening leading into the lagoon formed by this coral reef is on its south-west side, and has a bar extending across it, with depths of from 9 to 13 feet.

General charts 928, 2576, 943, 2660b, 1263.

Chart 1868, Taganak to Tawi Tawi. Var. 1° 40' E.

The reef has several small islands and islets on its west, south, and east sides, the highest (50 feet) being near the south-east extreme ; all these are low, covered with bushes, and hardly visible at a distance of 6 miles.

If running down at night to pass either to the east or west of the bank the soundings would give warning of the vicinity of the central reef, but it is too steep to the north and south for the lead to be of much service unless going very slowly.

Anchorage.—There is fair anchorage on the bank either to the north-east or south-west, in the south-west and north-east monsoons respectively, but the tidal streams are very strong, running at the rate of from 3 to 5 knots an hour.

Tides.—It is high water, full and change, on the Pearl bank, at 6h. 5m. ; springs rise 5 feet.

Talamtan bank (*Lat. 5° 42' N., Long. 119° 28' E.*) is composed of sand and coral, the shoalest part of 5 fathoms being in the position given. It is about 3 miles in length north-west and south-east, and 1½ miles wide, within the 10-fathoms contour line.

A depth of 4½ fathoms was reported to have been obtained by the Master of the ss. *Offenbach* in 1907 when passing over what is considered to be the Talamtan shoal, off the north-east coast of Borneo. As the bottom was clearly seen it is probable that there is even less water over the shoal.

With wind against the tide there are heavy overfalls and tide rippings round this bank, sometimes extending as far as the eye can see, and much resembling broken water.

General charts 928, 2576, 943, 2660b, 1263.

CHAPTER V.

**VERDE ISLAND PASSAGE TO ILOILO. SOUTH-WEST COAST OF LUZON
TO SIGAYAN POINT.—NORTH AND EAST COASTS OF MINDORO.—
TABLAS AND ADJACENT ISLANDS.—WEST COAST OF PANAY.**

VARIATION IN 1911.
Slightly increasing.

*Chart 2577, Between San Bernardino and Mindoro straits, &c.
Var. 1° E.*

VERDE ISLAND PASSAGE.—Verde island passage is the name given to the strait that separates the south-west part of Luzon from the north coast of Mindoro. It is constantly used by vessels trading between Manila and Iloilo, Sebu, and other ports in the Philippines, and is the western entrance of the route through San Bernardino strait, formerly used by the galleons, to Acapulco, in America.

Verde island divides the strait into two passages, either of which may be taken, but that north of Verde island is preferable as the southern one is interfered with by the Bakos islets. The tidal streams in the channel are very strong, attaining a rate of 3 to 4 knots at springs; the flood stream sets to the eastward, and the ebb to the westward. There are no records of the tidal hours, but they are reported to be the same as at Manila.

In this chapter is described the route through Verde island passage, down the east coast of Mindoro, and the west coast of Panay, to Iloilo.

Lubang islands, situated off the western entrance to the Verde island passage, are described in Chapter II., pages 32-35.

LIGHT (*Lat. 13° 53' N., Long. 120° 2' E.*).—From a square brick tower, 67 feet in height, with white lantern, attached to the western angle of a rectangular brick dwelling, and erected near the west extreme of Cabra island, the outer or westernmost of the Lubang group, is exhibited at an elevation of 217 feet above high water a *white group flashing light* with a period of *one minute*, thus:—flash, *eight seconds*; eclipse, *seven seconds*; flash, *eight seconds*; eclipse,

General charts 943, 2661b, 1263.

Chart 2577; Between San Bernardino and Mindoro straits. Var. 1° E. thirty-seven seconds; visible 22 miles in clear weather. For arc of visibility, see Light list and chart.

SOUTH-WEST COAST of LUZON.—**Cape Santiago** is moderately high, wooded, and surrounded by a reef which extends about a cable from the shore, and dries. The depth at the edge of the reef is from 4 to 5 fathoms, deepening abruptly to 40 and 60 fathoms at the distance of half a mile. *See view a, at page 308.*

LIGHT (*Lat. 13° 46' N., Long. 120° 39' E.*).—From a red conical brick tower with white lantern, 51 feet in height, near the south point of Cape Santiago, and attached to the south side of a brick dwelling, is exhibited at an elevation of 90 feet above high water, a *white group flashing light* with a period of *thirty-six seconds*, visible 16 miles in clear weather.

The light shows groups of *three flashes of four seconds* each, with eclipses intervening; interval between flashes *two seconds*, between groups *twenty seconds*. For arc of visibility, *see Light list and chart.*

Cape Santiago is a semaphore and telegraph station.

Pagapas bay, between Cape Santiago and San Pedriño point to the northward, is very deep, and affords no good anchorage; the shore is fringed by a narrow reef with deep water near its edge. There are two small breaks in the reef at the head of the bay, each about 250 yards in extent, where a small craft could find sheltered anchorage.

San Pedriño point is high and bold; it is well wooded, and is encircled by a reef that extends half a cable from the shore.

BALAYAN BAY, the great bay between Cape Santiago and Bengalet point, is 13 miles wide and extends about 12 miles northward; it is clear of danger, with bottom of sand and mud, but the shores are so steep that a vessel must approach very close to it to get within a depth of 12 fathoms.

Winds and tidal streams.—The winds in this bay follow the monsoons generally; the land breeze blows nearly every evening. The flood stream sets northward, and the ebb southward.

Balayan town, at the mouth of the river of that name, is situated 6 miles northward of San Pedriño point. Only boats of light draught can enter the river, as the depth on the bar is only 3 feet at high water. The town affords supplies of all kinds.

There is a coral reef extending over a quarter of a mile off-shore in front of the town, on the outer edge of which there are several shoal spots that show at low tide; in front of the town there is also a rock awash at low water.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Light (*Lat. 13° 56' N., Long. 120° 44' E.*).—A *red fixed* light is exhibited at Balayan from a white framed structure, 36 feet above high water, and is visible from a distance of 7 miles. For arc of visibility, *see* Light list.

Anchorage.—Balayan anchorage has depths of from 7 to 20 fathoms. The usual anchorage for large vessels is in 10 or 12 fathoms, about 3 cables off-shore, with the light bearing N. 32° W. and the dome of the church N. 66° W. Small vessels drawing 10 feet or less anchor abreast the east end of the reef, in 5 to 7 fathoms, with the light on the same bearing.

Telegraph.—Balayan is a telegraph station.

Tide.—It is high water, full and change, at Balayan, at 7h. 37m.; springs rise $4\frac{1}{2}$ feet.

Taal and Lemery.—These towns are situated about 11 miles east-south-eastward from Balayan on opposite banks and near the mouth of the Pansipit river. This river, which flows from Taal lake, enters the bay about half a mile below the bridge which connects the two towns; there is a depth of 7 feet of water on the bar at high water, allowing small vessels and launches to enter. The inhabitants, as also those of Balayan, are engaged chiefly in agriculture, rearing cattle, and in fishing. Provisions are plentiful, and there is active commerce with the province of Manila.

Taal is a signal station.

Light.—A *red fixed* light, visible about 2 miles, is shown from a pole on the beach.

Anchorage.—There is anchorage off Taal and Lemery in from 10 to 20 fathoms. The usual anchorage for large vessels is about $3\frac{3}{4}$ cables westward of the light, in 15 or 16 fathoms. Small vessels anchor according to draught anywhere off the town of Lemery.

Bengalet point, the western extreme of Kalumpan peninsula, is a rocky bluff, 440 feet high, fringed by a narrow reef, which runs all round the south-west end of the peninsula to near Cazador point. This part of the coast is clean, with depths of 25 fathoms close to it.

Cazador point is the south end of Kalumpan peninsula, which separates the bays of Balayan and Batangas; the peninsula is about 7 miles in length, from $1\frac{3}{4}$ to $2\frac{3}{4}$ miles in breadth, and rises to a height of 1,645 feet above the sea. Cazador point is formed by a tongue of land about 150 feet high, covered with trees. Off the point, and joined to it, are some rocks; on its eastern side a reef extends about one cable, deepening abruptly, with soundings of 70 to 90 fathoms at $2\frac{1}{2}$ cables south-east of the point.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

BATANGAS BAY, contained between Cazador point and Matokot point, $8\frac{3}{4}$ miles east-south-eastward, penetrates 9 miles to the northward; it is clear and deep, with steep coasts. From Cazador point the coast for 6 miles north-north-eastward is rocky and wooded; it can be passed at the distance of half a mile. From thence the coast is low, with sand beaches intersected by numerous small rivers.

Bauan, a small, unimportant town at the head of Batangas bay, may be recognised by a conspicuous white church, which forms a good landmark for vessels entering the bay.

Batangas, the principal town in the bay, is a coastwise port of considerable importance, with a population of 33,131 in 1903. It is situated about 3 miles south-eastward of Bauan, on the Kalumpunan river, about three-quarters of a mile inland. The landing is marked by a dilapidated stone pier and a few houses on the beach. Batangas is a telegraph station.

Fishing stakes are placed all along this part of the coast, at about one cable from the shore; there is an opening in the stakes abreast the pier and river.

Light (*Lat. $13^{\circ} 45' N.$, Long. $121^{\circ} 2' E.$*).—A red fixed light is shown at an elevation of 31 feet above high water from a white framed structure at the inner end of the pier at Batangas; it should be visible in clear weather from a distance of 7 miles.

Buoys.—Two buoys have been established south-westward of the pier at Batangas. The northern of the two is moored in 7 fathoms about $2\frac{1}{2}$ cables S. 55° W., and the southern in 8 fathoms about 3 cables S. 39° W., from Batangas pier light.

Anchorage off Batangas may be taken in a depth of from 10 to 20 fathoms; a good berth for large vessels is in from 15 to 18 fathoms, south-westward from the pier. Small vessels steer for the pier on a N.E. bearing, and anchor in 8 or 9 fathoms, allowing sufficient swinging room to clear some broken piles, formerly part of a wooden extension of the pier.

Between Bauan and Pinamukan point, $3\frac{1}{2}$ miles southward of Batangas, the whole coast is formed by sand beaches, and vessels of all sizes can anchor off it, but necessarily very close in on account of the great depth of water. Between Bauan and Batangas a depth of 12 to 14 fathoms will be found at less than 2 cables from the beach, and this anchorage is preferred by the small vessels that visit this coast on account of its good holding ground and proximity to these two towns. East and west of the above roadstead the bottom is of gravel and rock.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Kalumpan river enters the bay $1\frac{1}{2}$ miles south-eastward of Batangas pier. The bank which forms its bar is $1\frac{1}{2}$ cables wide, and has very little water on it at low tide. The river brings down volcanic ashes and pieces of pumice stone, which together form both its banks and the bar, and cover part of the bottom in the neighbourhood.

Coast.—From Batangas pier the coast trends southerly for about $7\frac{1}{2}$ miles to Matokot point, the eastern entrance point of Batangas bay. From the Kalumpan river to Naboled point about 4 miles southward the coast is lined with sand and gravel, thence to Matokot point it is lined with boulders and fringed by a narrow, steep-to coral reef. Depths of 5 fathoms are found close to the shore, and off Matokot point the 100-fathoms line is within 4 cables of the land.

MARIKABAN ISLAND (*Lat. 13° 39' N., Long. 120° 54' E.*), lying southward of the Kalumpan peninsula, at the distance of nearly $1\frac{1}{2}$ miles from Cazador point, is $7\frac{1}{4}$ miles long east-south-east and west-north-west, high, and covered with trees, amongst which the useful Buri palm (*Corypha Gebanga*) is frequent. On its eastern end there is a remarkable mountain, 1,469 feet high, that commands all parts of the island; at the western end there is another, not so high, terminating in a peak which can be seen very distinctly from the neighbourhood of Cape Santiago.

Sepok point, the north-western extreme of Marikaban island, is a steep rocky headland, 120 feet high; when seen from a distance it appears to be isolated, being connected with the main body of the island by a rocky isthmus 4 or 5 feet above high water.

The whole coast of the island is bordered by rocks, and two rocky islets, named Kaban and Sombrero, lie off the north-western end, and two others, Culebra and Malajibomanok, off the eastern end.

Kaban islet, to the eastward of the north-western point of Marikaban, is one mile long north and south, narrow, 285 feet in height, and wooded. Sombrero islet, 142 feet high, and covered with low bushes, lies half a mile north of the north-western point of Marikaban, and is surrounded by a coral reef with some heads above water and others awash. The islet forms a good landmark.

Culebra islet lies 3 cables eastward of Marikaban; it is about a quarter of a mile in length, east and west, and about half that in width. It is about 60 feet high and wooded, the tops of the trees being about 95 feet above the sea. The shores are rocky except the most northern point, which is coral sand. The channel between Culebra and Marikaban is about one cable wide with a depth of 6 fathoms.

Malajibomanok, lying 7 cables eastward of Culebra, is small, low, covered with trees, the tops of which are about 35 feet above

General charts 913, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. the sea, and is surrounded by rocks. In the channel between Malajibomanok and Culebra the depths are from 8 to 20 fathoms.

Dangers.—At one mile S.W. by S. from Sepok point there is a shoal of $1\frac{1}{2}$ cables extent, covered by a least depth of 5 feet; between it and the coast there is a channel three-quarters of a mile wide and 20 fathoms deep in the middle.

A shoal about $1\frac{1}{2}$ cables in extent, north and south, and covered by 2 fathoms least water, lies about a quarter of a mile northward of the north end of Kaban islet.

A reef with rocky heads awash and deep water alongside lies about $1\frac{1}{2}$ cables from the north shore of Marikaban island, with Cazador point bearing N. $\frac{1}{2}$ W., distant about $1\frac{1}{10}$ miles.

Port Marikaban is formed by the strait between Marikaban and Kaban islands, and can be entered from either end, but the passage from the northward is preferable. Small vessels sometimes take refuge here, anchoring off the village of Marikaban, and mooring to the shore and to each other to prevent swinging.

Marikaban strait, between Marikaban island and Cazador point, is clear and safe, the only danger being the shoal a quarter of a mile north of Kaban islet. The strait is only used by coasters, which can anchor in case of need near the island; but the tidal streams are very strong, and the anchor must be let go so close to the rocks that there is danger of being driven on shore before it bites. The channel south of Marikaban is clear and deep, and is always used in navigating Verde island passage.

VERDE ISLAND (*Lat. 13° 33' N., Long. 121° 4' E.*), from which the passage takes its name, is 1,311 feet in height, well wooded, and shows two peaks said to be visible at a distance of 42 miles. It can be approached with safety, though there are detached rocks close to the shore; off the south-east point there are some rocks that uncover at the distance of one cable from it. On the north side of the island there is a bay in which the depth is 10 to 15 fathoms near the shore, with a high coast and occasional sand beaches; it affords shelter in southerly winds.

Verde island, with the south coast of Luzon to the north of it, and the north coast of Mindoro and Bakos islands to the south, forms the two channels of Verde island passage; both are safe, but the northern channel, or North pass, is preferred, as the southern one is interfered with by the Bakos islets. See page 309.

COAST of LUZON.—**Matokot point**, which forms the eastern extremity of Batangas bay, is high, precipitous, and wooded, with one low point to the south-west. The coast to the eastward is

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. rocky for one mile as far as a sloping point (Ilijan); it then forms a slight indentation, ending in Arenas point, $1\frac{1}{2}$ miles eastward. In this bay small coasters find anchorage during the north-east monsoon, to avoid the ebb stream. The shores of this part of the coast are covered with the *Palo Maria*, a tree of the natural order Guttiferæ, which yields a valuable gum.

Arenas point, the second point east of Matokot, consists of sand and stones, which serve to distinguish it; it is low and clean, and the tidal streams rush past it with great velocity. Talaji point, $1\frac{1}{2}$ miles E. by N. of Arenas point, rocky and wooded, is not prominent; to the westward of the point good water can be obtained which comes from a valley of Mount Talaji. From here to Rosario point, 6 miles eastward, the coast is covered with trees, and shows a sandy beach fringed by rocks close to.

Lobo is situated about one mile in-shore from the head of the bay immediately westward of Rosario point.

Rosario river debouches at the point of the same name; there is a bar at the mouth with 3 or 4 feet over it at low water. From Rosario river to Malabrigo point the shore is sandy, wooded, and of regular height.

Anchorage can be found in northerly winds between Points Matokot and Malabrigo, but the shore is very steep, and at less than 2 cables from it the depth is from 8 to 13 fathoms; bottom, coarse sand and gravel.

Good anchorage may be had off Lobo in 12 fathoms, at $1\frac{1}{2}$ cables off-shore, with Malabrigo point light just showing over the shrubbery on Rosario point, and a conspicuous white house N. 35° E.

Malabrigo point (*Lat. $13^\circ 36'$ N., Long. $121^\circ 16'$ E.*) is the south-western point of the broad headland formed by the spurs of Mount Lobo; Punas point is the central, and Malagundi the eastern point of this headland. The coast comprised between them is of moderate height and well wooded, rocky between Malabrigo and Punas, and bordered with a sandy beach and rocks from here to Malagundi, off which point lies a small islet surrounded by rocks. Punas point is remarkable by some red patches at a short distance from the beach, and the peaks of Mount Lobo, 3,103 feet high, serve to indicate the position from the south-east. See view *b*, at page 308.

LIGHT.—On Malabrigo point, at an elevation of 185 feet above high water, an *alternating white and red group flashing light every twenty seconds*, is exhibited thus:—*red flash, eclipse, nine seconds; white flash, eclipse, three seconds; white flash, eclipse, eight seconds;*

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. visible 20 miles in clear weather. The lighthouse is a white cylindrical brick tower, 56 feet high over keeper's dwelling, which is also white, with red roof.

Lokoloko or Sigayan point.—From Malagundi point the coast shows the same sand beach for about $5\frac{1}{2}$ miles to the little river Sigayan, where the high land of the Sierras behind Punas point terminates. The river is narrow and shallow, and fresh water can be obtained at a little distance from the mouth. No description of Sigayan point itself is to be found in the Spanish Derrotero, or in the Philippine islands Sailing Directions.

Anchorage.—Vessels can anchor between Malagundi and Sigayan bay, but close to the shore, which is very steep. The bottom is generally of coarse sand mixed with gravel.

Sigayan bay, immediately west of Lokoloko point, is nearly 3 miles wide and curves one mile northward. Over two-thirds of the bay is filled with a coral reef, covered at high water, and vessels wishing to anchor should do so well over in the western part of the bay.

The description of the coast to the eastward, and Marinduque island, is continued in Chapter VIII.

NORTH COAST OF MINDORO.

Cape and Mount Kalavite and the coast to the southward have been described in Chapter II.

Binuangan point (*Lat. 13° 29' N., Long. 120° 20' E.*), 4 miles north-north-east of Cape Kalavite, resembles it in appearance, and is bold to approach, the few rocks interspersed along this part of the coast lying close in.

Anchorage.—South of Binuangan point there is a small bight with a sand beach, in front of which there is anchorage during the north-east monsoon in a depth of $5\frac{1}{2}$ fathoms, sand, at $1\frac{1}{2}$ cables from the beach. A rivulet of good water enters here. There is another anchorage immediately north of Cape Kalavite, but it is not so good.

Point del Monte, situated about $5\frac{1}{2}$ miles east-north-east from Binuangan point, is of sand, with a small bank of one fathom off it. Bagalayag point, about 9 miles eastward of Point del Monte, is girt with rocks which extend a mile along the coast to the eastward.

Coast.—From Bagalayag point to Bogio point, $8\frac{1}{2}$ miles eastward, the coast is high, and heavily wooded; between Baeto and Bogio points is almost precipitous, and here a mountain rises to a height of 3,339 feet. The shore line becomes sandy at about a mile east of Bagalayag point, and continues so, with a few small stretches of boulders, to Baeto point, where there are very large rocks; thence

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. to Bogio point, about 3 miles, the shore is sandy. At Bogio point, the eastern slope of the 3,339-foot mountain is covered with greenish-yellow grass up to 2,000 feet. There are no dangers, and the coast may be approached to half a mile.

Ilog anchorage (*Lat. 13° 28' N., Long. 120° 44' E.*), eastward of Bogio point, is easily recognised by the deep depression in the coast range forming a low narrow plain, with a slightly indented bight, bordered by a sand beach 2 to 3 miles long. A bank with 3 fathoms on its edge fronts the eastern part of the bight, and extends $1\frac{1}{4}$ cables off-shore for a distance of 3 miles, the depth increasing rapidly outside it.

Towards the middle of the bight there flows a fresh water river, the Cervantes, which can only be entered by small coasters and *bancos* at high water; farther eastward there is another river, the Matabang.

Shelter may be obtained here during south-west winds, but the anchorage is necessarily very close-in to the edge of the shoal water. The off-shore squalls are very violent. From the anchorage the west end of Marikaban island bears N.N.E.

COAST.—Eastward of Matabang river the coast is rocky, with many small hillocks from 300 to 400 feet high, with sand beaches between them, as far as the Kameron river, which can be entered by small boats; thence to Talipanan point the coast becomes bold, and at the point almost precipitous; then another sand beach, with one small break, until Minolo point is reached. This part of the coast is backed by a fairly high range of hills, with a higher range behind them, which approaches the shore to the eastward. Mount Talipanan, a peak of this range, forms a sharp point at an elevation of 3,826 feet, and is very conspicuous; this range is generally covered with clouds except in the early morning. From the Matabang river to the Kameron river, the hills are partly wooded and partly grassy, thence to Port Galera they are heavily wooded, as are all the mountains in the background. The coast may be approached to half a mile.

Minolo point, 3 miles west of Port Galera, is covered with trees; there is a beach on its eastern side before which anchorage can be had on a bottom of sand and gravel. The shore is steep, and the depth 25 to 30 fathoms at the distance of 3 cables from it.

At three-quarters of a mile eastward of Minolo point is a small bay half a mile deep and half that distance wide, in which the anchorage area is reduced by reefs fringing the shores to a basin about $1\frac{1}{4}$ cables in diameter, with depths of from 8 to 12 fathoms; the entrance carries 4 fathoms in the middle.

General charts 943, 2661b, 1263.

Plan 949, Port Galera, &c. Var. 1° E.

PORT GALERA (*Lat. 13° 31' N., Long. 120° 57' E.*) is situated between a promontory projecting from the coast of Mindoro and the islands Medio and Panikian. These islands, lying at the entrance of the bay, close north-westward of the peninsula, form the port, which has two passages, one on either side of Medio island; there is no practicable entrance southward of Panikian.

The flood stream enters the port by the north-west channel and passes out by the north channel, and then follows the trend of the land to the eastward; the reverse conditions take place with the ebb stream. This fact should be remembered when making the port.

From Escarceo point, the eastern extremity of the promontory, to the north point of Medio island, the shore presents a uniform appearance, and the north channel is not readily seen; but a signal post on Telegraph point, the north-western extreme of the promontory, and a remarkable white patch like a sail on the fall of the point, serve to indicate it. The land above the shore is covered with trees.

Medio island, about one mile in length, north-north-west and south-south-east, has a high and jagged western coast, with rocks and a reef extending nearly a cable from its south-west point; shoal water extends $1\frac{1}{2}$ cables off the western side of the south part of the island; a reef and shoal flat fringe its north-eastern shore to the distance of about one cable; the 5-fathoms contour line lies a cable further off. There is a tide race off the bare rocky North point.

Shoal.—A rocky patch with a least depth of $1\frac{1}{2}$ fathoms and half a cable in extent is situated in the southern part of the North channel with the south extreme of Medio island bearing N. 75° W., distant three-quarters of a cable.

Panikian island is two-thirds of a mile in extent, and is fringed with reef on its north and east sides for a short distance, and on the east and west sides shoal water extends about 150 yards off. Its north-west side is high and rugged, and its southern extreme is a sandy point forming with Mindoro a channel half a cable wide, closed by sand.

DIRECTIONS.—North channel.—After clearing the north point of Medio, keep in the middle of the channel, where the depth is $6\frac{1}{2}$ fathoms, coarse sand and rock; it is a cable wide at the entrance between the 5-fathoms lines, but lessens to half a cable abreast the east side of Medio, which is low and bordered with a sandbank; when nearing the southern end of the channel steer south-westward so as to pass the south point of Medio island at a distance of rather less than half a cable, to avoid the $1\frac{1}{2}$ fathoms shoal mentioned above, and anchor as convenient.

General charts 2577, 943, 2661b, 1263.

Plan 949, Port Galera, &c. Var. 1° E.

During the north-east monsoon the north channel is the best, but with sailing ships, even this channel is dangerous, as calms or baffling winds may be experienced, and the tidal streams are strong.

North-west channel.—A vessel from the westward should steer for the middle of Medio island, until the entrance is open, bearing about E.S.E., and then keep midway between Medio and Panikian islands to the anchorage. This channel is narrowed at the entrance to 130 yards between the 5-fathoms lines by the rocks off the south-west point of Medio, but it widens inside to $1\frac{1}{2}$ cables; the least depth is $6\frac{1}{2}$ fathoms at the entrance, increasing inside to 14 fathoms.

Anchorage.—The available space inside the islands is considerably reduced by projections from the promontory of Mindoro of low land with shoal water between them, and by a shoal that advances from the southern part, having on its north-eastern end rocks that are awash at very low water. The largest available anchorage is east of Panikian, and is about 3 cables in diameter, with a depth of from 10 to 13 fathoms.

The anchorage for small craft is in a confined creek in the southern part; at the entrance, the channel of which is 130 yards wide, the depth is $6\frac{1}{2}$ fathoms, shoaling towards the town of Port Galera on the southern shore. At $1\frac{1}{2}$ cables north of the mouth there is another shoal of one fathom least water, which extends north-westward about $2\frac{1}{4}$ cables from the eastern entrance point. Between this shoal and the opening between Panikian and the mainland there is a space of $1\frac{1}{2}$ cables width, and depths of 6 to 10 fathoms where there would appear to be better anchorage.

The village is situated on the south side of the port; water is scarce.

Tides.—It is high water, full and change, at Port Galera at 10h. 59m.; springs rise 5 feet.

Escarceo point (*Lat. 13° 21' N., Long. 120° 59' E.*), so named from the tide runs off it, is of jagged rock, covered with trees; the shore between it and Boaya point, 2 miles to the south-west, is clear, with deep water off it. The currents run here with great velocity, causing strong eddies.

LIGHT.—A light, *white occulting every ten seconds*, thus:—light, *seven seconds*; eclipse, *three seconds*, is shown at an elevation of 135 feet above high water, from a white wooden framed structure, 47 feet high, on Escarceo point. The light is visible 15 miles in clear weather. For arc of visibility, *see* Light list and plan. There is also a detached dwelling with red roof.

General charts 2577, 943, 2661b, 1263.

Plan 949, Port Galera and Varadero bay. Var. 1° E.

Varadero bay is an indentation in the coast $2\frac{1}{4}$ miles south-westward from Escarceo point and open to the south-east; it is half a mile across at the entrance between Boaya point on the north and Varadero point on the south side, and half a mile in depth.

Boaya point is clear, but the southern point of the bay, Varadero, sends out rocks to half a cable's distance which are awash at low water, and beyond which foul ground extends three-quarters of a cable. A spit of shoal water with a depth of $1\frac{1}{2}$ fathoms extends about 2 cables southward from the north shore of the bay; the extremity of the spit is about 2 cables W. by N. from Boaya point.

The bay affords good anchorage in from 6 to 12 fathoms in both monsoons, especially during the south-west season, when the heavy squalls pass to the northward of it. It is decidedly preferable to Port Galera, especially in bad weather.

Light (*Lat. 13° 30' N., Long. 120° 57' E.*).—A red fixed light is exhibited at an elevation of 85 feet from a flagstaff on a hill near the village of Port Galera, visible 7 miles in clear weather.

Anchorage.—The best anchorage for large vessels is in a depth of 9 fathoms with the flagstaff from which the light at Port Galera is exhibited bearing W.N.W. During fresh north-east monsoon weather, the wind sometimes hauls well eastward, and considerable sea is felt at this anchorage. Small vessels can find good anchorage, sheltered from all winds and sea, in 11 fathoms, in the cove immediately westward of Boaya point. The western side of Boaya point is fairly bold, and the anchor should be dropped about a cable from the shore. The shoal spit mentioned above must be avoided.

Chart 2577, Between San Bernardino and Mindoro straits, &c.

Subaang is a little town on the summit of a hill at a distance of 6 miles S. by E. $\frac{1}{4}$ E. from Escarceo point; near the town there is a bay with anchorage sheltered from the south-west in a depth of 7 fathoms, sand.

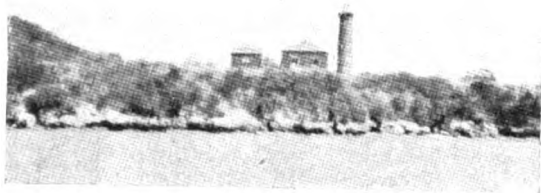
Subaang bay is about $4\frac{1}{2}$ miles wide and one mile deep southward. The shore is low and wooded, and intersected by several small streams.

Shoal.—A shoal extends a quarter of a mile north-eastward from the west entrance point of Subaang bay. It hardly reaches out far enough to constitute a danger; in windy weather it is of a dull red colour, due to the stirring up of the silt from the rivers along the coast.

COAST.—From the eastern point of Subaang bay the coast trends eastward, and consists mainly of a delta formed by the washings

General charts 2577, 943, 2661b, 1263.

(a)



Cape Santiago Lighthouse.

(b)



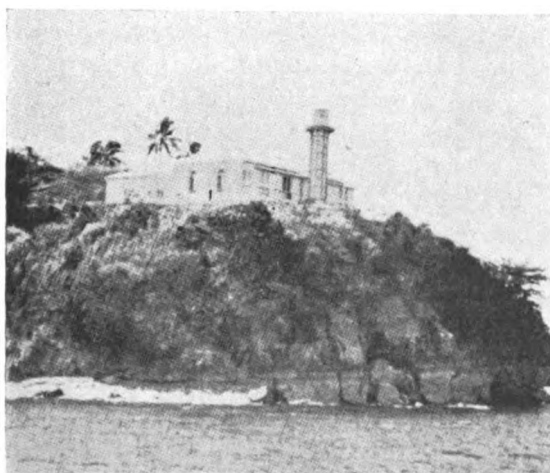
Malabrigo Point.

(c)



Maniguin Island Lighthouse.

(d)



Lusaran Point Lighthouse.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. of the River Bako and others, producing 4 miles of broken coast-line, cut into by bars and passages as far as Point Balete, the western point of Kalapan bay.

Balete point is about 100 feet high and well wooded.

A reef of sand and rocks, dry at low water, lies with its northern edge W. by N. half a mile from Balete point.

Kalapan point (*Lat. 13° 26' N., Long. 121° 12' E.*) is wooded and rises to a height of 290 feet. The western and northern sides are clear, but on the eastern side there is a narrow fringe of rocks with deep water close-to.

Kalapan bay, between Balete and Kalapan points, is $2\frac{1}{2}$ miles wide, and extends southward three-quarters of a mile. Sandbanks front the town to the distance of half a mile.

Kalapan.—This small town, lying at the head of Kalapan bay, is the capital of the province of Mindoro. The commerce is insignificant. A municipal building and a wharf, with about 10 feet of water at the end, stand on the west side of Kalapan point. Kalapan is connected with Batangas and Boak by telegraph cables.

LIGHT.—A *red fixed* light visible 7 miles in clear weather is shown, at an elevation of 28 feet above high water, from a white concrete pillar on the outer end of the wharf, near Kalapan point.

Directions.—The safest course to pursue when entering or leaving this bay is to keep in the middle of the passage between the Bakos islets and the coast of Kalapan; and, when the southernmost of these islets bears North to steer for the anchorage.

Anchorage.—There is no good anchorage off Kalapan. The anchorage recommended is in 7 to 10 fathoms, rocky bottom, with the church bearing S. 4° E. and Kalapan point N.E. by E. $\frac{1}{2}$ E. The bottom is irregular and rocky, and this position should be approached with caution owing to the rapidity with which the water shoals. If the wind freshens and has any northing in it, a nasty sea rises, landing is impossible, and the anchorage should be quitted if nothing depends on remaining.

With strong north-easterly winds a fairly protected anchorage may be found westward of Kalapan point, but necessarily very close in on account of the great depth of water. The south-eastern part of the bay is shoal.

Bakos islets.—This is a group of three small wooded islets, extending 2 miles north-east and south-west, situated with the south-western and largest islet about $2\frac{3}{4}$ miles N.W. by W. from Kalapan point. The islets are 295, 260, and 130 feet high, respectively, begin-

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. ning with the south-western one. A shoal of coral and rocks, covered with sand, with a least depth of $1\frac{1}{2}$ fathoms, lies about one mile S.W. by W. of the southern islet. A reef, dry at low water, extends about a quarter of a mile eastward of the middle islet. The channels between the islands are deep, but the rapid currents that prevail here make it imprudent for a vessel to take them.

Silonay islet (*Lat. 13° 26' N., Long. 121° 12' E.*) is a small wooded islet, 350 feet high, lying about one mile north-eastward of Kalapan point. Rocks extend about half a cable north-eastward and three-quarters of a cable eastward of Silonay, with deep water immediately outside them.

Anaganahao islet, about half a mile southward of Silonay and one mile east-south-eastward of Kalapan point, is very small, shaped like a sugar loaf and 100 feet high. It is surrounded by rocks, which extend to a considerable distance northward and southward of it. There is a narrow navigable channel with a depth of 6 fathoms between the islet and the coast, but it is only used by small coasters.

The channel between Silonay and Anaganahao islet is narrowed by rocks to about a quarter of a mile between the 5-fathoms lines, and has a least depth of 7 fathoms; a rock awash is shown in about the centre of the passage. The channel is seldom used because of the small saving of distance and the great velocity of the tidal streams in it.

The N.E. COAST of MINDORO.—From Kalapan point the coast trends south-eastward for $29\frac{1}{2}$ miles to Dumali point, the eastern extremity of Mindoro island. The first 13 miles of this stretch of coast, as far as the mouth of the Lumangbayan river, is low, heavily wooded, intersected by several small streams, and bordered by a grey sand-beach. The villages of Silonay and Navotas lie at the mouths of the rivers of the same names, at $2\frac{1}{2}$ and $5\frac{1}{2}$ miles, respectively, from Kalapan point; the village of Kanipisan lies at the mouth of the Kawayan river, about 8 miles south-eastward of Kalapan point. The Kawayan and Baluagan rivers discharge at the same point, and there is a small grassy islet at their confluence. This part of the coast is clear, and anchorage may be found in 15 fathoms, mud, at almost any point. The soundings decrease gradually except at the bar, which extends about half a mile off the mouths of the Kawayan and Baluagan rivers, where the depth decreases from 10 fathoms to one fathom in a distance of about half a cable. Naguiba and Lagarian points, situated 7 and 11 miles, respectively, from Kalapan point, are low and covered with light timber and brush; they are not conspicuous, and can only be recognised when well in-shore.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Naujan (Lat. $13^{\circ} 20' N.$, Long. $121^{\circ} 18' E.$).—The town of Naujan, clean and well built, with some 2,400 inhabitants, is situated about 9 miles south-eastward of Kalapan point, and about one mile in-shore on the left bank of the Baluagan river; the steeple of the church is covered with galvanised iron.

The bar at the mouth of this river, like the bars of the other rivers in this vicinity, is nearly dry at low water, and the river can only be entered by pulling boats at a favourable stage of the tide. The ebb stream in the river is very strong.

Naujan is connected with Kalapan by road and telephone. The village of Estrella, which is the port of Naujan, lies on the beach about half a mile N. $68^{\circ} E.$ from Naujan church; a large warehouse is conspicuous from seaward.

Anchorage, exposed to north-east winds, may be found about one-third of a mile north-eastward from the above-mentioned warehouse, in 15 fathoms, mud; a round-topped hill, about 4 miles southward, bearing S. $3^{\circ} E.$, leads to the anchorage and eastward of the shoal water off the river mouths.

Lumangbayan river, of which the Naujan river, flowing from Lake Naujan, is a branch, discharges about 4 miles south-east of Naujan; it is one of the largest rivers in northern Mindoro, and forms the dividing line between the low land previously mentioned and the mountainous district round Polak bay. The village of Lumangbayan lies on the beach northward of the mouth of the river.

Coast.—From about 2 miles south-eastward from the mouth of Lumangbayan river the coast trends eastward for about 4 miles to Tagusan point, and then southward for about 2 miles to Anahauan point, the north-western entrance point to Polak bay. This part of the coast is very irregular and rugged; the points, which are all outlined with cliffs, vary in height from about 50 to 150 feet, are heavily wooded, and do not present any special features by which they may be recognised. The mountains, which approach the shore in this vicinity, reach a maximum height of 1,400 feet.

Tajud point has an islet off it, connected with the shore by a reef dry at low water. It lies a quarter of a mile from the shore, and is very small, wooded, and 150 feet high. At about half a cable south-west of the islet is a detached rock, 15 feet high, with other rocks awash around it.

In the vicinity of Tajud and Tagusan points, there are some peaked hills a short distance from the coast; in-shore of this range of hills is a round wooded hill, which forms a good landmark for vessels seeking an anchorage off Estrella; *see above*.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Polak bay, open to the north-east, is clear of dangers; the depth in the entrance is 35 fathoms, lessening to 9 fathoms at 3 cables from the beach at the head of the bay. Anahauan point, the northern point, is fringed with reef to a distance of 3 cables, with depths of $2\frac{1}{2}$ to 5 fathoms at its edge. At 2 miles southward of Anahauan point is Tiguihan cove, and about three-quarters of a cable south-east of its south entrance point is a conspicuous rock, 18 feet high, with a small rock, 3 feet high, just eastward of it. The head of the bay is a sandy beach, 2 miles long, between two rivers, the western of which has 2 feet on the bar at low water, at which time the bar of the eastern one dries. The town of Polak, with 859 inhabitants in 1903, is situated on the left bank of the western river. A large storehouse, with a galvanised iron roof, is the most conspicuous building; the eastern side is painted black, and an unpainted door in the centre is visible several miles in a south-west direction.

Anchorage may be had in 15 fathoms, mud, with the storehouse bearing S.W. $\frac{3}{4}$ W., and the 18-foot rock W. by N., or for smaller vessels closer in in a depth of 10 fathoms, with the storehouse W.S.W. and the 18-foot rock N.W. by W. $\frac{1}{2}$ W.

Tiguihan cove, in the north-western part of the bay, affords sheltered anchorage for small craft, but stern moorings have to be taken to the shore.

Coast.—The eastern point of Polak bay is faced with cliffs, and fronted by huge boulders, and is clean and steep-to. Thence the coast curves to the south-east for over 3 miles to Dumali point, and is in general fringed with a very narrow reef, dry in parts at low water. It is clean, and may be approached to half a mile.

Dumali point (*Lat. 13° 7' N., Long. 121° 34' E.*), the eastern extreme of Mindoro island, formed by the termination of the shoulder of Mount Dumali, is heavily wooded and faced with bare cliffs, from the edge of which it rises gradually towards the summit of the mountain. The depths are 49 fathoms close off Dumali point, and 37 fathoms at the distance of less than a mile from the rounded coast to the southward.

Mount Dumali, about $2\frac{1}{2}$ miles S. 60° W. from Dumali point, is 2,498 feet high, and is the highest and most conspicuous mountain in north-east Mindoro, lying as it does close to the coast, with no mountains in its vicinity at all approaching it in height.

DIRECTIONS for Verde island passage.—After rounding Cape Santiago at the distance of a mile, S.E. by E. is a good course until abreast the south point of Marikaban island; from thence pass between Verde island and Matokot point in Luzon. Verde

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. island can also be passed on the south side, but the ledge of rock extending from the south-east point of that island must be avoided. The North channel is much to be preferred, more particularly at night, when Malabrigo light kept on the bearing E. $\frac{1}{4}$ N. will lead through in mid-channel.

When well past the north-east point of Verde island, a course S.E. $\frac{1}{4}$ E. will lead one mile east of the northern Bakos islet, and, if continued for 40 miles, will pass 3 miles north-east of Dumali point; thence a course S. $\frac{3}{8}$ E. may be steered to pass down the west coast of Panay.

EAST COAST of MINDORO.—From Dumali point, to the southward as far as Pinamalayan river, the coast is steep-to; from Balate point to Sukol river the shore consists of sand beaches, which may be approached to within a mile, and in most places to a less distance. Between the mouth of the Sukol river and the mouth of the Abongabon river, about 6 miles south-eastward, shoal water extends to a considerable distance, and in one place the 5-fathoms curve is found nearly one mile from the shore.

The town of Abongabon is situated near the mouth of the River Gobongon, about 4 miles north-westward of Abongabon point; at $1\frac{1}{4}$ miles southward of the town is the River Masi. A reef of rocks awash at low water extends half a mile out from the mouth of the Masi river. The charts show scarcely any soundings about this coast.

The coast between Abongabon river and Duyagan point, $3\frac{1}{2}$ miles southward, is foul, shoal water extending a considerable distance, and in some places the 5-fathoms curve is found about half a mile from the shore. A north or south line passing one mile eastward of Duyagan point clears all shoal water northward of it.

Anchorage.—There is anchorage southward of the town of Pinamalayan (*Lat. 13° 2' N., Long. 121° 30' E.*), off the entrance to the river in 7 fathoms, sand and mud, with Dumali point bearing N. 47° E. and the largest house in the town N. 35° W.

In leaving this anchorage for the southward it is best to head well off-shore in order to avoid shoal water some distance off Balate point.

Between Balate and Abongabon points vessels may anchor anywhere along the coast, well sheltered from westerly winds, in a depth of 4 fathoms at a distance of 2 miles and in 3 fathoms at one mile. In the elbow of the coast north-west of Abongabon point, off the River Masi, there is excellent anchorage during south-west gales in depths of from 4 to 7 fathoms, sand. Off the mouth of the Abongabon river the water is too deep for anchoring.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Duyagan point (*Lat. 12° 38' N., Long. 121° 32' E.*) is flat, wooded, and surrounded by extensive reefs.

Tiklin point, 6 miles south-west of Duyagan point, is flat and sandy; at less than half a mile east-south-east of it there is Vela bank, a rocky shoal, one cable in extent, awash at low water, with 3½ fathoms at its edge. One mile further out to the south-south-east there is another shoal, Lagaoín Grande bank, 3 cables in extent, awash at low water, with depths of 4 to 8 fathoms at its edge. At about half a mile eastward of the latter shoal the depth is 4½ fathoms.

Mansalai bay, situated about 2 miles south-westward from Tiklin point, is small but well sheltered, with good holding ground. Vessels of any size can anchor in it, sheltered from all winds except those from the south-east. The northern entrance point is marked by two round-topped hills which serve to mark the point when coming from the southward; the outer hill shows red to seaward. From these hills a low spit projects southward. There is a small rock above water off the end of this spit, and foul ground extends some distance southward from the rock. The southern entrance point is marked by two round-topped hills, which are wooded to the water's edge; this point is clean and bold. There is a depth of 5 fathoms in the middle of the port, and in the southern part one to 3 fathoms, sand, at 3 cables from the shore. The village of Mansalai is small. Water can be had from a rivulet in the western part of the bay, but with difficulty, as loaded boats can only leave it at high water.

Anchorage may be had in Mansalai bay in 5 fathoms, mud and sand, with the northern entrance point bearing East, and a large two-storied house with a large tree in front of it bearing N.W. by N. From this position the depths decrease regularly towards the village.

Directions.—In approaching this anchorage from the northward, do not bring Duyagan point to the eastward of North until the entrance of the bay is well open, in order to clear the Lagaoín bank. The hills on the southern entrance point should be steered for on a West bearing, and when nearing them the course should be altered to N. 35° W., heading directly for the village and the anchorage above mentioned. In entering the port care must be taken not to approach the north shore, which is bordered by a reef.

Kagolong bay, immediately southward of Mansalai bay, offers excellent anchorage in from 5 to 10 fathoms, sand and mud, in westerly winds, for vessels of any size. From the northern entrance point a ledge of rocks, partly uncovered at low water, projects, and in the southern part of the bay there is a shoal patch. Vessels seeking shelter here should stand in for the middle of the bay, and anchor

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. according to draught. Off the southern side of the entrance are two rocks, which uncover at half tide; when these are in line the depth is 5 fathoms, and it is not advisable to go closer in.

Mansiol point is of medium height and wooded. South of the point is a little bay, in which coasters can anchor in a depth of $5\frac{1}{2}$ fathoms.

Buyallao island, $1\frac{1}{4}$ miles in length north-north-west and south-south-east, and narrow, is of regular height, densely wooded, and fringed with foul ground to the distance of $1\frac{1}{2}$ cables; two sharp-pointed rocks lie off its north-west end.

Chart 971, Semirara, Ilin, and Ambolon islands, &c.

Buyallao point (*Lat. $12^{\circ} 21' N.$, Long. $121^{\circ} 26' E.$*), $18\frac{1}{2}$ miles south-south-westward of Duyagan point, is of peaked rocks, covered with trees, with little hills in the interior, by which it may be easily distinguished. Foul ground extends a quarter of a mile south-eastward from the point.

Soguikay bay has a steep beach on its northern side, where the depths are 7 to 15 fathoms at one cable from the shore; the western coast is bordered with rocks to the distance of about 3 cables. Small vessels can anchor in case of necessity inside Soguikay island. Fresh water can be procured at the head of the bay.

Soguikay island is low and surrounded with a reef which extends about one-third of a mile from its north and south points; some detached rocks lie off the west side. In the passage between this island and the coast the depth is 15 fathoms.

Pandan point, $4\frac{1}{2}$ miles south-westward of Buyallao point, is round and of middling height; a reef with $4\frac{1}{2}$ fathoms on it lies about half a mile southward from the point, with 9 fathoms between.

Tambaron isle, separated from Pandan peninsula by a channel about one cable wide, is steep-to; the passage appears clear, and has a depth of 9 to 15 fathoms.

Masin islet, lying close to the southward of Tambaron, is also steep-to except on the south side, which is fringed with reef. On the west side there is a small bay where coasters can anchor.

Bulalakao bay, about 2 miles wide, and running in northward for the same distance, affords shelter from all but southerly winds; it has a depth of 23 fathoms at the entrance, and 12 fathoms in the middle, decreasing to 4 fathoms, sand, near the sand beach at the head, where three small streams enter the bay near Bulalakao village. The east coast of the bay is covered with trees, and on that side there is a little cove, called Port Lagara, sheltered from all winds, with a

General charts 2577, 943, 2661b, 1263.

Chart 971, Semirara, Ilin, and Ambolon islands, &c. Var. 1° 10' E. depth of 11 fathoms, mud. No supplies can be obtained at Bula-lakao.

The islets Alibatan, Silat, and Aslom are surrounded with rocks. The passages formed between them, and with the coast of Mindoro, are clear and deep. There is limited anchorage suitable for coasters, between Aslom and the Mindoro coast.

Burunkan point, the southern extremity of Mindoro, is free from danger, and can be passed close-to. It is composed of low limestone cliffs much underworn by the sea. The land behind the point rises rapidly, reaching a height of 253 feet at the distance of one-third of a mile. Pandarochan bay has been already described. *See* page 44.

The SEMIRARA ISLANDS form a group of eight islands lying off the south end of Mindoro, extending to a distance of about 25 miles from Burunkan point; they are all surrounded by reefs.

Semirara (*Lat. 12° 3' N., Long. 121° 23' E.*), 8½ miles in length, north and south, and the largest of the group, is hilly, reaching an elevation of about 512 feet at the highest part. On the west coast there are several small bays which are almost entirely obstructed by reefs, on the edge of which are depths of 5 to 13 fathoms. Off the town of Semirara, which stands on the top of a hill facing the largest bay, the anchorage is very bad even for coasters; at this part the shore reef extends to a distance of 1½ miles. The east coast is bordered by a reef which projects about a mile from the north-east part of the island; on coming from the north this side of the island must not be approached within 3 miles until the town of Semirara bears West. There is anchorage off the south end of the island in a depth of 5 to 8 fathoms, sand, during the north-east monsoon. Good coal for steaming purposes has been found on the island.

Libagao island, about 6 miles north-eastward of Semirara and less than a mile in extent, is 410 feet in height at its northern part; it is surrounded by reef the limit of which has not been clearly defined, and should not therefore be closely approached.

Nagubat, nearly midway between Semirara and Libagao, is very small and flat; at one mile to the eastward there is a shoal of 4½ fathoms which appears to be united with the island. The channel between Nagubat and Libagao is deep, as is also the passage between Nagubat and Semirara.

Sibolon, 148 feet in height, lying about 10½ miles eastward of the north-east point of Semirara island, is fringed with reef and is unsafe to approach.

Chart 2577, Between San Bernardino and Mindoro straits.

Kaluya, about 6 miles south-eastward of Semirara island, is 623 feet high at the south part; there is a bay on the west side of the

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E. island with a low shore and sandy beach, in the north-east part of which there is anchorage in a depth of $5\frac{1}{2}$ fathoms with the north point of the bay bearing N.N.W. $\frac{1}{2}$ W. and the south point S. $\frac{1}{2}$ W.

Chart 971, Semirara, Ilin, and Ambolon islands, &c.

Sibaton, 111 feet in height, is separated from Kaluya by a channel of 3 fathoms which appears practicable for small craft. The reef which surrounds Sibaton extends 2 miles south-eastward from its north point. The islet is unsafe to approach.

Chart 2577, Between San Bernardino and Mindoro straits.

Sibay is 213 feet high; its north-west point rises to a peak and is clean; its north coast can be passed at the distance of half a mile, but the west side should not be approached.

Panagatan reef has already been described in Chapter II. See page 46.

Var. 1° E.

ISLANDS EAST OF MINDORO.—**Maestre de Campo island**, lying S.E. 12 miles from the south-east shore of the lofty promontory formed by Mount Dumali in Mindoro, is of circular form, $3\frac{1}{2}$ miles in diameter, high, mountainous, and generally sparsely wooded; it has very steep-to shores, only affording anchorage to small craft. The summit of Maestre de Campo, when seen from the eastward, appears like a ridge with three distinct hillocks, the highest of which, near the northern part of the island, has an elevation of 1,120 feet. The coastline is rugged and rocky, with cliffs 50 and 100 feet high in places. Small quantities of tobacco and copra are raised; there is abundance of fresh water.

Plan 949, Port Concepcion.

Port Concepcion (*Lat. 12° 54' N., Long. 121° 44' E.*), on the south-east side of Maestre de Campo, is the principal anchorage; it is easy of access, $6\frac{1}{2}$ cables in width at the mouth between San Martin and Fernandez points, and of about the same extent north-north-west. A tongue of land projecting 4 cables south-south-east from the head of the port divides it into two bays; in the westernmost of these, which affords protection except from easterly and south-easterly winds, there is anchorage for small vessels in a depth of 8 to 10 fathoms, sand and mud, in front of the town of La Concepcion; larger vessels can anchor in the middle of the port, southward of the village, in from 16 to 20 fathoms, rock and sand. During the north-east monsoon, heavy squalls come off the hills. The interior of the port is lined by a rocky steep reef. The port is of no commercial importance, and is seldom visited by steamers. The eastern bay is open to the southward, and is only fit for small craft.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Dos Hermanas are two islets, named Carlota and Isabel, about 150 feet high, and separated by a deep channel $1\frac{1}{4}$ miles in width. Carlota islet (*Lat. 13° 1' N., Long. 121° 54' E.*) lies 10 miles N.E. $\frac{3}{4}$ E. from the eastern point of Maestre de Campo island; Isabel islet is eastward of Carlota.

From a distance the two present a similar appearance, both showing a uniform, straight, and level skyline, dropping to the water in a terrace at each end.

The shore line consists of cliffs from 20 to 80 feet high, underworn in places to a distance of 40 feet. On the north side of each islet is a narrow fringe of coral, dry at low water, and north-east from Carlota there is a narrow coral spit, sloping gradually to 25 fathoms at a distance of half a mile. Both islets are thickly covered with small timber and bushes, the tops of which rise to a height of 195 feet on Carlota and 215 feet on Isabel. On Carlota, some fishermen's families live on the north shore, where there is a small valley and a small coral beach. Isabel is uninhabited. Landing is everywhere difficult, except in the finest weather. The islets are surrounded by deep water.

Anchorage may be had on the coral spit north-eastward from Carlota.

Banton island, lying 17 miles eastward of Maestre de Campo island, is about $3\frac{1}{2}$ miles in extent, and triangular in general outline, one side facing north, another east, and the third and longest, south-west. The greater part of the island is occupied by a central ridge, rising to a height of 2,016 feet at the northern end. From east or west the ridge appears regular along the summit, with a slight dip to the south, while from north or south the crest appears as a small cluster of several very sharp peaks, rising steeply to the east, and covering more than one half the width of the island. The north and east sides of the island are nearly straight, with no special features; the south-west side is broken by two points, between which lies Mainit bay, and on each side a smaller bight. None of these afford anchorage, being too deep and exposed. The shores of the island are formed of dark limestone cliffs from 40 to 80 feet high, and coarse sand beaches, with many large irregularly-shaped boulders, and the entire island is fringed by a narrow steep-to coral reef, except at the north-east and south-west points, where the cliffs come down sheer into deep water. Inland, the vegetation is mixed; occasional patches of small trees, thin kogon grass, and a few cultivated fields appear from seaward, but in many places the hill sides are bare and rocky.

The town of Banton lies on the eastern shore, in a little elbow of the hills fronted by an open shingle beach. It contains a large stone

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. church and fort. Although isolated and poor, it is clean and well kept.

Communication is irregular, and steamers never call unless special arrangements are made, for there is scarcely any trade, and the products are insignificant.

Anchorage.—Only a precarious anchorage may be found off Banton island, either off the point southward from the town, or on a coral shelf off the south-east point, both in 15 fathoms. Landing is difficult in any but the smoothest weather, and dangerous when there is any surf.

Bantoncillo islet, 320 feet high, lies 3 miles south-westward of Banton. It is three-quarters of a mile long, north and south, and narrow; off its southern end is a pinnacle rock, 90 feet high. The islet is partly covered with trees and bushes, and partly with grass, and is fringed by a steep-to coral reef; at about half a mile off the southern end a depth of 9 fathoms is charted.

Simara island (*Lat. 12° 48' N., Long. 122° 4' E.*), lying about 4 miles southward of Banton, is of irregular shape, $4\frac{1}{2}$ miles long north-east and south-west, over 2 miles wide at the south-west end, and rises near the centre to a height of 756 feet. The shores are bold, with no deep bights, except at the south-west end, where there is a mangrove swamp, recognisable only when close in-shore, occupying the centre of the low western spit, and entirely closed by reefs. The north-western shore is low throughout, and fringed by large boulders along the edge of the narrow shore reef, 50 to 100 yards from the land. The usual low rough cliffs and coral beaches are found, but at the north-eastern point the face of the cliff is 80 feet high, with no reef at its foot. Round the south point are coarse shingle and sand beaches; off the town and westward, the reef is widest, having immense coral heads along its edge and slightly deeper water inside. Landing is possible only in fair weather, or on the sheltered side of the island, and should not be attempted when there is any surf.

The town lies on an open sand-beach just west of the southern point, and contains more than half of the inhabitants of the island. The church is a large nipa building, and there is a ruined fort on the hill behind it. There is no regular communication and no trade, nothing being produced for outside sale.

Anchorage.—There is no anchorage where swinging room may be found, because of the great depth of water close to the edge of the reefs, but on the south-east side of the island and inside the $1\frac{1}{2}$ -fathoms shoal mentioned below, there is anchorage at a short distance from the shore in from 11 to 14 fathoms, with the peak on Simara bearing between N. 45° W. and N. 60° W.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Shoals.—A shoal on which the least depth is 7 fathoms, coral, is situated 2 miles S. 60° E. from the north-eastern extreme of Simara island.

A reef with a least depth of $1\frac{3}{4}$ fathoms over it is situated N. 84° E. $2\frac{1}{2}$ miles from the south extreme of Simara island. The reef, which is small, consists of coral boulders, and is surrounded by deep water; there is a good deep channel between it and Simara, the north-east point of the island bearing N. 11° E. leads through.

TABLAS ISLAND, lying about 27 miles eastward of the south part of Mindoro, is 35 miles long, north and south, and about 10 miles broad; it is mountainous, and on its north-eastern extremity is the peak Cabezo de Tablas, 2,284 feet in height; generally the coasts are clear and steep-to. Off the north end are two rocky islets, distant one cable from the shore; the larger islet, Origen, has two pinnacles, 110 and 40 feet high, and is clear and steep; the smaller one, named Guindauayan, 480 feet high, has rocks around it, close-to. On the west coast there are anchorages for small craft in the north-east monsoon, and on that side is the sheltered port of Lug. From the south-west point of a wide bay on the west coast northward of Bagulayan point, a reef projects one mile to the northward and fronts the coast southward to Bagulayan point; the chart shows 11 fathoms near its end. The town of Odiungan is situated in the south-east corner of the bay.

Reef.—A reef about three-quarters of a mile in extent, with a least depth of $4\frac{3}{4}$ fathoms on it, lies in a position from which Origen islet, off the north-west extreme of Tablas island, bears S. 89° E., distant $2\frac{1}{4}$ miles.

Clearing marks.—Cobrador island light in line with the north tangent of Origen islet leads northward of the reef in 16 fathoms, and the eastern extremes of Banton and Simara islands in line lead eastward.

Plan 972, Port Lug.

Port Lug (*Lat. 12° 15' N., Long. 121° 58' E.*) is the only sheltered anchorage on the west coast of Tablas during the south-west monsoon. The port is about 4 miles in extent north and south, and and from one to 3 miles east and west. The shores are steep-to and the depth of water from 9 to 20 fathoms, mud. The entrance points are more than a mile apart, but the channel is reduced to the width of half a mile by a reef that projects to a distance of 6 cables from the northern point. Within the mouth, in the approach to the anchorage there is a rocky shoal 4 cables in length, north-east and south-west, and 2 cables wide, a small portion of which dries at low water; it is

General charts 2577, 943, 2661b, 1263.

Plan 972, Port Lug. Var. 1° E.

steep-to, with depths of $5\frac{1}{2}$ to 9 fathoms northward of it. The town of Lug is on the north shore.

Anchorage.—During the north-east monsoon, vessels of all sizes can anchor on the north side of the harbour, before the town, in a depth of 9 fathoms; and during the south-west monsoon at the south end of the port, distant 3 or 4 cables from the shore in 15 fathoms, mud, sheltered from wind and sea from all directions, a berth being given to a long narrow projection of reef that juts out from the south-west part of the deep southern bight.

In entering Port Lug, the southern point of the entrance should be made for, and sailing vessels working in should be conned by sight.

Water.—Near the western side of the town of Lug there is a river of good water into which boats of light draught can enter.

Chart 2577, Between San Bernardino and Mindoro straits.

South or Kabalian point (*Lat. $12^{\circ} 6' N.$, Long. $122^{\circ} 1' E.$*), the south point of Tablas island, ends in a sand-beach; a bank of coral and sand, covered by depths of from 6 to 17 fathoms, extends some $5\frac{1}{2}$ miles south and south-south-east from the point. Kabalian point should be passed with the north extreme of Karabao island bearing between W. $\frac{3}{4}$ N. and W. by N. $\frac{1}{4}$ N.

Tamboloton bay is the name of the wide bay southward of the Cabezo or north-east point of Tablas; in this bay vessels can find shelter in the S.W. monsoon, but the water is very deep. There is a depth of 8 fathoms very near the shore, bottom fine sand, with the western entrance to Port Romblon bearing E. by S.; the shore is steep, bordered by rocks very close to it. From the southern part of the bay, 4 miles from the north-east point, a ledge of rocks juts out to a distance of three-quarters of a mile.

The channel between the north-east point of Tablas and the islands Romblon and Cobrador, is $3\frac{1}{2}$ miles wide and free from danger. It is the route usually taken from Verde island passage to Jintotolo channel.

Shoal.—At 5 miles north of Kalaton point and $1\frac{1}{2}$ miles from the coast, near the town of Lanan, there is a bank of sand and rock $1\frac{1}{2}$ miles in diameter, with $5\frac{1}{2}$ fathoms on the shallowest part, and a depth exceeding 100 fathoms near its eastern edge.

Kalaton point, on the south-east coast, is formed by a high bluff, which advances $1\frac{1}{2}$ miles from the coast, with depths of 5 to 12 fathoms alongside it; the chart shows a shoal lying about three-quarters of a mile E.S.E. from the point. In the bay, formed by the point and the islet Kabahan, to the southward, there is anchorage in a depth of $5\frac{1}{2}$ to 11 fathoms, with Kalaton point bearing N.E.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Romblon and the islands to the eastward are described in the next chapter.

Karabao island (*Lat. 12° 4' N., Long. 121° 55' E.*), lying 3½ miles south-west from the southern end of Tablas island, is hilly, and rises to a peak 718 feet in height. Its coast is clear and steep, and the rocks that fringe the shore lying very close in; on the east side there is a sand beach off which vessels can anchor in a depth of 5 fathoms.

The channel between Karabao and Borokay is clear, but the tidal streams are very strong. The flood sets eastward and the ebb westward.

Shoals.—A shoal with a depth of 8 fathoms over it is reported to exist 3½ miles N. 64° E. from the south-east point of Karabao island.

A shoal with a least known depth of 5 fathoms has been reported eastward of Karabao island, with the south-eastern extreme of that island bearing S. 87° W., distant 5½ miles.

Borokay island lies less than half a mile to the northward and westward of Pitol point in Panay, and extends 4 miles north-north-west; the summit is 436 feet in height. On the west side there is a bank extending from a half to one mile from the shore, with depths of from 4 to 9 fathoms, where anchorage can be had if required. The channel between Borokay and Pitol point is clear, but there are rocks on both sides of it, and the tidal streams rush through the passage with great force.

Charts 2577, 2578.

PANAY ISLAND is situated 27 miles to the south-east of Mindoro; it has an area of 4,611 square statute miles, and is the fifth island in the Philippines in size. It is of an irregular quadrangular shape with three projecting angles, that at the south-east being rounded off; but here the island of Guimaras, separated by a very narrow strait, appears to have once formed another projection. A chain of mountains runs in a curved line from the north-western to the southern promontory, and from the centre of this another chain branches off to the north-eastern promontory, thus dividing the island into three natural districts, which form the provinces of Antiki, Kapiz, and Iloilo.

Panay is exceedingly fertile, being well irrigated by numerous mountain streams; and it supports a large population of Bisayas, with a few Negritos in the mountains. It produces rice in abundance, sugar, cotton, coffee, tobacco, pepper, and cacao. Ebony and sapan-wood are obtained from the forests, while pearl shells, tortoise-shell, and trepang are found on its coasts. It is, after Luzon, the most

General charts 943, 2661b, 1263.

Charts 2577, 2578. Var. $1^{\circ} 10' E.$

densely peopled and highly cultivated island of the group, having about 743,000 inhabitants. It has three large towns—Kalibo, Kapiz, and Iloilo, the latter a port of entry and a place of very large trade. There are no volcanoes on the island.

Chart 2577, Between San Bernardino and Mindoro straits, &c.

Potol point, the northernmost extreme of Panay, is flat and sandy, with a few trees over it; to the east of the point, and at less than a mile from it, there are detached, sharp-pointed rocks; small craft can pass between them and the coast at high water. Outside these rocks are others, sunken.

WEST COAST of PANAY.—The promontory rising to an elevation of 3,000 feet above the sea, and forming the north-west extremity of the island of Panay, terminates in this part in a clear and steep coast, the most salient points of which are those of Nasog and Pucio.

Nasog point, the north-west extreme of the island, is a wooded bluff 718 feet high, and steep-to; on its northern side there is a good anchorage in a depth of 5 fathoms, sand, before the river and village Malay.

Pucio point (*Lat. $11^{\circ} 46' N.$, Long. $121^{\circ} 49' E.$*), 8 miles S. by W. $\frac{1}{2}$ W. of Nasog point, to which it is similar, is 620 feet high, and girt with rocks which project to some distance.

The anchorage of Buruanga is between the above points in a small bay, with a depth of $3\frac{1}{2}$ to 5 fathoms before a beach, near the mouth of a little river. Between Buruanga and Pucio point the coast is fringed with detached rocks, the largest of which are clear, but the lesser ones throw out reefs to the distance of half a mile; behind these rocks the coast presents high rocky cliffs with cascades falling over them.

The coast from Pucio point to Jinalinan is clear with deep water near it, and is bordered in general with sand beaches. Two lines of hills run parallel to the coast; their slopes are cultivated and dotted with churches.

Pandan bay is clear of danger and deep, and there is good anchorage off the town during the north-east monsoon in a depth of from 7 to 10 fathoms. The town of Jinalinan is in the bend of the coast; at 2 miles south-eastward of it is the town of Santa Fe.

Shoals.—A bank with $1\frac{3}{4}$ fathoms on it lies $1\frac{1}{2}$ miles westward from the village Sebaste, $7\frac{1}{2}$ miles southward of Santa Fe, and a coral reef about 150 yards in diameter, with a depth of 4 fathoms on it, lies about 5 miles westward of the same village, with Maniguin island lighthouse bearing S. 88° W., distant 18 miles.

Maniguin island, $12\frac{1}{2}$ miles to the south-west of Pucio point, is nearly $1\frac{1}{2}$ miles long, north-west and south-east, and about 4 cables

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E. wide at the southern end. The northern end is flat and wooded; the southern end rises to a height of 112 feet. There is no good anchorage, the island being fringed with a narrow, steep reef. See view c, at page 308.

LIGHT.—A *white group flashing light*, showing groups of *two flashes*, separated by an eclipse of *two and a half seconds, every ten seconds*, has been established on Maniguin island. It is elevated 191 feet above high water, and visible 20 miles in clear weather. The light is shown from a concrete tower, 97 feet high, painted grey, with a red lantern.

Batbatan isle, situated 19 miles S. by E. $\frac{1}{4}$ E. from Pucio point, and 7 miles westward of Lipata point, is about $2\frac{1}{2}$ miles long east and west and 550 feet in height, with a central hill; it appears to be steep-to. The channel between it and the coast is clear.

Carmen bank, situated approximately in lat. $11^{\circ} 23' N.$, long. $121^{\circ} 38' E.$, and lying 12 miles S. by W. $\frac{1}{4}$ W. from Maniguin island, with the summit of Batbatan bearing E. by N. $\frac{1}{2}$ N., is about 2 miles in extent with the least depth near its centre of $4\frac{1}{2}$ fathoms; on the rest of the bank the depth is from 7 to 23 fathoms.

Seco islet bears S.W. by W. $\frac{1}{4}$ W. 15 miles from Batbatan, and S.S.E. $\frac{1}{2}$ E. nearly 3 miles from Carmen bank. It is less than one cable in extent, about 26 feet high, and covered with trees, probably mangroves; at low water rocks dry out 3 cables from the sand. The islet is surrounded by a shoal extending about half a mile in all directions, and breakers are said to extend about one mile farther northward than indicated on the chart; the depths at three-quarters of a mile from it are from 25 to 69 fathoms. A shoal is shown $2\frac{1}{2}$ miles E. by N. $\frac{1}{2}$ N. from Seco islet.

Sultan and Bennington banks have already been described in Chapter II. See page 66.

Lipata point (Lat. $11^{\circ} 28' N.$, Long. $122^{\circ} 3' E.$), formed by a low, wooded tongue of land that advances one mile to the westward, is surrounded by a reef which extends three-quarters of a mile north-westward; there is anchorage to the north of the point in uneven depths, from $5\frac{1}{2}$ to 23 fathoms, which is the only anchorage on the west coast of Panay during the south-west monsoon.

Maralison islet, lying $3\frac{1}{4}$ miles S.S.W. $\frac{1}{2}$ W. of Lipata point, and $1\frac{1}{2}$ miles off the coast, is about one mile long east-north-east and west-south-west and 285 feet high. A reef lies off the west end of the islet. On the coast, facing the islet, is the town of Kolasi, to which small steamers run from Iloilo.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.

Shoals.—In front of the town of Tibiao, between Kolasi and Nalupa, there is a bank with a depth of 6 fathoms on it, lying at the distance of $1\frac{1}{2}$ miles from the shore. Before the town of Nalupa (Barbaza in the Philippine islands Sailing Directions), there are rocks awash, and a coral bank with $1\frac{1}{2}$ fathoms least water on it lies $2\frac{3}{4}$ miles W. by N. from the town.

Chart 2578, E. part of Sulu or Mindoro sea.

The coast from Nalupa to Dalipé point is clear, with deep water near it; it consists of sand beaches forming slight indentations, and is cut into by several rivulets. Several small towns are on the shore. The River Sibalon, 5 miles north of Dalipé point, has two mouths; both have bars on which there is less than one fathom water. At a mile south of the river is the town of San Pedro.

Shoals.—A sunken rock, marked on chart P.D. with less than 6 feet, is reported by fishermen to lie about $1\frac{1}{2}$ miles from the shore, abreast of the River Palma, north of Bugason.

There is a bank with a depth of 10 fathoms situated about 3 miles west from the mouth of Sibalon river.

Dalipé point (*Lat. 10° 46' N., Long. 121° 55' E.*) is low, and fringed with a narrow strip of rocks; it may be recognised by an old fort with a roof on the southern part of the point.

San José de Buenavista, the capital of Antiki province, is situated at the northern end of a bay extending from Dalipé point to Mapatag point, about 9 miles southward. It is small and of little commercial importance, and is almost hidden by large trees, only a few iron roofs being visible from seaward. There is a small stone pier about 50 yards long, fit only for small craft. Small steamers run from Iloilo.

Telegraph.—The cable from Cuyo lands here, and there is telegraphic communication with Iloilo.

Dangers.—A coral reef, 20 yards in diameter, and with a depth over it of 17 feet at low water, lies three-quarters of a mile southward of the south extreme of the point on which the town of San José is situated. There is a depth of 7 fathoms inside, and of 9 fathoms outside, the reef.

Three dangerous sunken rocks with 6 feet of water on them lie southward and eastward of the pier; the first lies 270 yards S. 56° E., the second $2\frac{1}{2}$ cables S. 15° E., and the third $5\frac{1}{4}$ cables S. 49° E. from the end of the pier.

Anchorage, exposed to all but north-east winds, may be found southward of the town of San José, and near it, in a depth of 6 to 7 fathoms, irregular rocky bottom. Strangers are advised not to go

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

too close in, as there are a number of rocks, and the bottom is said to be foul.

The River Malandok enters the bay about 2 miles south-eastward of the town; the depth on the bar is 6 feet at low water and 18 feet inside.

The coast from the Malandok river to Naso point is very steep, and bordered by a sand-beach, except at some of the points. A number of small streams with only a few inches of water on their bars cut through the shore, and there are several towns along it, the principal one of which, Dao, may be recognised by a conspicuous church with a square iron-covered tower. Jaldan point, about $4\frac{1}{2}$ miles northward of the town of Anini, is a sharp, bold, rocky point 90 feet high, projecting prominently into the sea.

NASO POINT, the wide south-west extremity of Panay, is formed by the termination of the coast range; it is clean and steep-to, and is fronted by the island Nogas off its south-west point, and the islet Hurao hurao, $2\frac{1}{4}$ miles to the eastward of Nogas. There is a conspicuous white church with an iron roof at the town of Anini, on the south-western point.

Nogas island lies off the town of Anini; it is surrounded by a reef, and forms with the coast a narrow channel suitable for small craft. In the middle of the western entrance there is a reef a quarter of a cable in diameter, with a depth of $2\frac{1}{2}$ fathoms on it. Small vessels can anchor east of Anini during the north-east monsoon in depths of from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms, sand. It is not advisable to anchor between Nogas and Hurao hurao, as the bottom is rocky. Hurao hurao islet is low, wooded, and surrounded by reefs; there is no channel between it and the main.

LIGHT (*Lat. 10° 25' N., Long. 121° 55' E.*)—A white occulting light every ten seconds, thus:—light, seven seconds; eclipse, three seconds, has been established on Nogas island at an elevation of 56 feet above high water, and visible 12 miles in clear weather. It is exhibited from a white framework wooden tower 53 feet high. For arcs of visibility, see Light list and chart.

THE SOUTH COAST OF PANAY trends north-east for 15 miles to Talisaya point, near San Joaquin, and this part of the coast is high, clean, and steep-to; from that point it trends east-north-eastward for a distance of 21 miles to the town of Oton, and is low, but free of danger till near Oton bank. Cresta de Gallo, a serrated ridge about midway between Anini and San Joaquin, is conspicuous. From Oton to Iloilo, $5\frac{1}{2}$ miles, the shore continues low and lined with cocoanut trees. The bights along the coast have deep water, and

General charts 943, 1263.

DIRECTIONS.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

a vessel can stand close in-shore, or from point to point, with safety; the wind scarcely ever blows on to the land, but there is no good anchorage, the coast being steep and the holding ground indifferent.

Chart 2391, Iloilo strait.

Oton bank is a bank of soft muddy sand, which commences about 3 cables west-south-west from the fort of Iloilo, and stretches for 6 miles to the west-south-west with a depth of from one to 6 feet for two-thirds of this distance; thence it continues south-west for $2\frac{1}{2}$ miles with a least depth of 3 feet, and then turns abruptly back to the eastward for about $2\frac{1}{2}$ miles towards Kabalik point, when it bends in a north-east direction for a further distance of $2\frac{3}{4}$ miles. The bank is reported to be extending westward; the depth on the southern portion of the bank ranges from $1\frac{1}{2}$ to 3 fathoms. Oton bank is composed of shifting sand, and vessels should not attempt to cross it. The western limit of 5 fathoms is shown on the chart to lie S. 24° W. of the dome of Oton, and the southern limit to be S. 74° W. of Muhuy, the rugged point one mile south-south-westward of Kabalik point.

The north-eastern part of Oton bank is covered with fishing stakes.

Buoys.—Two black can buoys mark Oton bank, No. 1 on the southern limit, and No. 3 on its south-eastern edge about half a mile north-north-westward of Kabalik point, with Bondulan point in line with the east side of Iloilo fort.

A red conical buoy (*Lat. $10^{\circ} 39' N.$, Long. $122^{\circ} 32' E.$*), No. 2, is moored on the southern end of the shoal lying south-westward of Bondulan point, which should be left to the eastward by passing vessels.

Directions.—After rounding Naso point steer E.N.E. for Santa Ana on the coast of Guimaras, and as the coast is bold stand in until Bondulan point is nearly in line with Kabalik point, N.E. by N.; then steer towards Bondulan point, passing about 2 cables from Kabalik point and preserving that distance from the Guimaras shore, until about one mile beyond Kabalik, when steer to pass close westward of the buoy marking the shoal ground extending south-westward from Bondulan point. Should the red buoy be gone or out of position, the twin spires and white dome of the church in the town of Molo steered for on a N. 5° E. bearing will carry the best water between the shoals. When the fort at Iloilo is well open of Bondulan point it may be steered for, and when abreast that point steer for the anchorage off the Iloilo river. See page 334.

Approaching Iloilo from the southward, Oton church, a large white-domed building on the sea coast, is a very conspicuous object. The

General charts 2578, 943, 1263.

Chart 2391, Iloilo strait. Var. 1° 10' E.

pilots reside on Guimaras island, and come off on a vessel approaching Kabalik point.

GUIMARAS ISLAND, in front of Iloilo, is 23 miles in length, north-north-east and south-south-west, and $11\frac{1}{2}$ miles in maximum width. It forms with Panay island the strait of Iloilo, and with Negros island the strait of Guimaras. It is moderately high and hilly, especially on the eastern side, where the hills Halhat, Pandan, and Akdan rise; in clear weather these hills can be seen from Sohoton point on the west coast of Negros. The western coast is clean and free from danger; the south-east coast is bordered by a number of islets, with navigable channels between them. The east coast is clear, depths of 4 to 6 fathoms being found at a distance of $1\frac{1}{2}$ miles from it. The island is fertile. It is connected with Panay by telegraph cable.

Kabugao point, forming the north end of the island, has some detached rocks off it. From the point the coast trends about south-west for $7\frac{1}{2}$ miles, forming capes and bays up to Bondulan point. A bank of $1\frac{1}{4}$ to $2\frac{1}{2}$ fathoms depth stretches out $3\frac{1}{2}$ cables off-shore in the bight between Estampa and Pontingbalas points, in which the town of Buenavista is situated.

Pier.—A military pier has been built out from Buenavista, and vessels of 12 feet draught can go alongside to water.

Bondulan point (*Lat. $10^{\circ} 40'$ N., Long. $122^{\circ} 34'$ E.*), opposite Iloilo, is 425 feet high, almost perpendicular, and steep-to. It forms a very prominent landmark when approaching Iloilo from the southward.

Shoal.—A shoal, with a least depth of $1\frac{3}{4}$ fathoms, extends south-westward for $1\frac{3}{4}$ miles from Bondulan point. Bondulan point in line with Iloilo fort leads north-westward of this shoal, which is marked at the south-west end by a red conical buoy, moored in a depth of $4\frac{1}{4}$ fathoms.

Kabalik point, 230 feet in height, which is clean and bold, lies $3\frac{1}{2}$ miles S.W. by S. of Bondulan point; this point should be passed close-to in taking the channel south of Oton bank, which is here less than half a mile wide, but looking from the westward Kabalik is not easily distinguished, being no higher than the rest of the coast, and is not so conspicuous as Muhuy point, situated one mile S.W. by S. of it, and which is also clean and steep-to. From the south, or when off Santa Ana, Kabalik point is, however, easily recognised. From this point the coast curves southward for $4\frac{3}{4}$ miles to Santa Ana bay, and is bold, with several little islets close to it.

Naburul islet, 152 feet high, lying close to the shore 3 miles southward of Kabalik point, appears from the westward as a high,

General charts 2578, 943, 1263.

Chart 2391, Iloilo strait. Var. 1° 10' E.

dark bluff; it is steep-to, and useful as a mark to vessels making the southern entrance of Iloilo strait. It is connected to the shore by a reef.

Santa Ana bay is a small harbour, clear and deep, open to the west and easy to make; the entrance is one-third of a mile wide. On the north side of the entrance is Lauy point, with an islet westward of it. Shoal water extends about three-quarters of a cable southward of the north entrance point, and less than half a cable from the south entrance point. The anchorage is in the middle of the port in a depth of 6 fathoms; the head and sides of the bay are shoal.

Tides.—It is high water, full and change, at Santa Ana bay, at 12h.; springs rise $5\frac{1}{2}$ feet.

Chart 2578, E. part of Sulu or Mindoro sea.

Igan bay, immediately south of Santa Ana, is clear, with a depth of 11 to 15 fathoms in the middle, and $2\frac{1}{2}$ to $5\frac{1}{2}$ fathoms at the edge of the bank that borders the shore.

Lusaran point, the western extremity of Guimaras island, is a bold prominent point easily recognised by the white lighthouse and dwelling on the cliff. It is clean and steep-to, the 10-fathoms curve being less than a quarter of a mile from the shore. *See view d*, at page 308.

LIGHT (*Lat. 10° 28' N., Long. 122° 28' E.*).—On Lusaran point, the western extreme of Guimaras island, from a white and grey cylindrical tower 38 feet high, with white dwelling, a *white and red alternating group flashing light every fifteen seconds*, is exhibited at an elevation of 111 feet above high water, visible 16 miles in clear weather. The light shows three *white* flashes, followed by a *red* flash; there is an eclipse of *two and a half seconds* between the *white* flashes, and one of *five seconds* between *white* and *red* flashes. For arc of visibility, *see* Light list and chart.

South point, about 5 miles south-eastward of Lusaran point, is situated on a small islet lying close to the southern extremity of Guimaras. Tandog island, immediately northward of South point, lies close to the shore; the channel between it and Guimaras is blocked by reefs, and in the bay northward of it there are several small islets. Shoal water is shown as extending nearly a mile south-westward of South point.

Shoal.—A small detached shoal with a least depth of 14 feet over it lies about three-quarters of a mile westward of the south point of Tandog island. When rounding South point it may be avoided by bringing Lusaran point to bear nothing westward of North.

General charts 2578, 943, 1263.

Chart 2391, Guimaras strait. Var. 1° 10' E.

Panubulon and Guiuanon are two flat-topped islets about 50 feet high lying one to 2 miles southward of Guimaras. The former is surrounded by a reef on which there are several smaller islets, but the latter is clear.

Anchorage.—The best anchorage in this vicinity may be found in the bay westward of Kabalagnan point, northward of Panubulon, in which there are depths of from 4 to 8 fathoms, mud.

Chart 2578, E. part of Sulu or Mindoro sea.

Shoal.—A shoal about half a mile in extent, part of which uncovers at low water, lies about $2\frac{1}{2}$ miles southward of the middle of Panubulon islet. The bottom between Panubulon and this shoal is very uneven, the depths varying from $3\frac{1}{2}$ to 10 fathoms.

Unisan islets are a group of rocky islets surrounded by reefs, lying $3\frac{1}{2}$ miles southward of the west end of Guiuanon islet. The central and largest is 93 feet high and partly covered with cocoanut trees; the others are merely large rocks, the eastern being 105 feet high. There is a depth of 9 fathoms in the channel between the Unisan islets and the shoal just described.

Chart 2391, Guimaras strait.

GUIMARAS STRAIT, between Guimaras island and the west coast of Negros, is 6 miles wide, but the navigable channels are narrowed by the islets and banks at the southern entrance. A depth of $6\frac{1}{2}$ fathoms can be carried through the strait.

Inampulugan island is the most remarkable in the strait. It is about 2 miles in extent and hilly, the highest point, 634 feet, being in the eastern part of the island. The shores of Inampulugan are clean and steep-to, with the exception of the northern point, where the shore reef extends about 3 cables.

Susan and five other small, partly-wooded islets lie westward and south-westward from Inampulugan. There is a good channel on either side of Susan islet, but they must be navigated with caution, as there are several dangers in their northern approach.

Piedra Rosario, a rock about 40 yards in extent, with a depth of $3\frac{1}{4}$ feet over it and 5 to 7 fathoms around, lies a little more than half a mile southward of the middle of Inampulugan, with the south point of that island bearing N. 85° W., distant two-thirds of a mile. A bank with from $3\frac{1}{4}$ to 5 fathoms on it extends for 3 miles to the south-westward of the rock.

Nalunga island (Lat. $10^{\circ} 30' N.$, Long. $122^{\circ} 43' E.$), 427 feet high, lying northward of Inampulugan, is small and covered with grass. There is a small islet off its northern side, with which it is

General charts 2578, 943, 1263.

Chart 2391, Guimaras strait. Var. 1° 10' E.

connected by a reef, and also a smaller islet off its north-east side. Shoal water extends nearly $1\frac{1}{2}$ miles southward of Nalunga, narrowing the channel between it and Inampulugan to half a mile; this channel is further complicated by a small shoal, dry at low water, lying about half a mile from the north-east side of Inampulugan.

Nadulao island lies nearly one mile north-east of Nalunga. It is small, covered with grass, and nearly cut in two by a bay on its north-east side, in which there is an islet. There is another small islet about 3 cables northward of Nadulao. The north-western and south-eastern parts of Nadulao, 213 and 190 feet high respectively, are connected by a narrow isthmus. Shoal water extends about half a mile westward and southward from Nadulao, and the channel between it and Nalunga is about 4 cables wide with a depth of $6\frac{3}{4}$ fathoms.

Iogiog bank, forming the eastern side of the main channel through Guimaras strait, is formed of hard sand. Within the 5-fathoms limit it is upwards of 5 miles long, north-east and south-west, with a greatest width of three-quarters of a mile. The least depth on the bank is 3 feet, west-south-westward of Pandan point, and patches of 4 and 5 feet are scattered along it over an extent of $2\frac{3}{4}$ miles. The northern end of the bank bears N.E. and the southern end S.S.E. $\frac{1}{4}$ E. from the south-east end of Nadulao island (*Lat. 10° 30' N., Long. 122° 44' E.*). A spur on which the depth is from $2\frac{1}{4}$ to 4 fathoms extends north-westward from the bank towards Nadulao island, leaving a deep channel less than a mile wide between the island and the bank.

Channels.—The main channel through Guimaras strait, nearly one mile wide between the 5-fathoms lines, and 9 fathoms deep, lies between Inampulugan and Nadulao islands on the west and the Iogiog bank on the east. The eastern channel lies between the Iogiog bank and Pandan point; it is nearly half a mile wide, with a least depth of 20 feet at its northern end, gradually widening southward with depths of from $5\frac{1}{4}$ to 10 fathoms. There are several good channels westward of Inampulugan used by the regular traders, but a stranger should use them with caution, as there are dangers in their northern approach; a rock awash at low water lies 8 cables north of Susan islet.

DIRECTIONS. — Main channel. — Vessels approaching Guimaras strait from northward or southward should bring the eastern points of Nadulao and Inampulugan islands in line S. 16° W. or N. 16° E. and steer for them, giving them a berth of a quarter to half a mile in passing; both points are steep-to. Vessels bound north may shape course as desired as soon as they have passed Nadulao;

General charts 2578, 943, 1263.

Chart 2391, Guimaras strait. Var. 1° 10' E.

those bound south should, after passing Inampulugan, continue their course with the above points in line until Guiuanon island bears West, and then haul to the westward a little to give the shoal water off the west coast of Negros a good berth.

East channel.—Vessels approaching from the north should bring Pandan point to bear S. 12° E., and steer for it; the shoalest part of the channel near this course (20 feet) will be found about one mile northward of the point. As soon as the water deepens, haul southward to pass about a quarter of a mile off the point, and when it bears N. 18° E. steer S. 18° W. until the hill on the eastern point of Inampulugan bears West, when haul to the westward to give the shoal water off the coast of Negros a good berth.

Vessels from the southward intending to use the East channel should bring the middle of Inampulugan to bear North and steer for it; when drawing towards it haul to the eastward until Pandan point bears N. 18° E. and steer for it, passing it as previously directed, and then steer N. 12° W. with the point astern; after having gone 1½ miles beyond the point the course may be shaped as requisite.

Tidal streams.—In Guimaras strait the flood sets northward and the ebb southward following the general trend of the channel. The highest observed velocity, in the vicinity of Pandan point, was about 2 knots, the ebb and flood apparently being about equal. Slack occurs approximately at the time of high and low water.

Plan of Iloilo river on chart 2391.

ILOILO (*Lat. 10° 42' N., Long. 122° 34' E.*).—The town of Iloilo, the capital of the province of that name, stands on a low sandy flat on the right bank of the Iloilo river; at the southern extremity of this flat is a spit on which a fort is built, and close to which there is deep water. Vessels not exceeding 250 feet in length and 16 feet draught can ascend the river a short distance, and lie alongside the wall fronting the town, but large vessels must anchor outside. It is a place of considerable commercial importance, and a port of entry.

The population of Iloilo was 19,054 in 1903.

LIGHTS.—A *white fixed* electric light, elevated 113 feet above high water and visible 15 miles in clear weather, is shown from the pilots' watch tower at Iloilo. The tower consists of steel framework, and is 109 feet high.

Jetties.—A *green fixed* light, elevated 10 feet above high water, and visible 3 miles in clear weather, is shown from a concrete pillar, 4 feet high, erected on the jetty head, northern side of the entrance to Iloilo river.

General charts 2391, 2578, 943, 1263.

Plan of Iloilo river on chart 2391. Var. 1° 10' E.

A red fixed light is exhibited from an iron mast, 23 feet high and painted red, on the jetty on the southern side of the entrance to Iloilo river, and is visible 7 miles in clear weather. For arc of obscuration, see Light list and chart.

Buoys.—A black and red horizontally-striped can buoy is moored in 6½ fathoms, mud, N. 89° E., 4 cables from the south extreme of Fort San Pedro, and marks the position of an old wreck. The buoy is moored in the least water in the vicinity.

There are also two cable mark buoys near the edge of the bank northward of the river mouth.

Trade.—The chief imports are coal, rice, petroleum, flour, cotton goods, and general merchandise.

The exports are sugar, tobacco, cigars, copra, sapan-wood, hides, and hemp; it is also the principal place of manufacture of piña, jusi, and sinamay, tissues greatly in use amongst the Philippines. The place occasionally suffers from a visitation of locusts.

In 1909, 102,748 tons of sugar were exported.

There is a British Vice-Consul at Iloilo.

Shipping.—In the year 1909, 118 vessels of 183,650 tons entered the port, and 117 vessels of 182,663 tons cleared; while, of the total, 71 British vessels entered, with a tonnage of 115,686, and 70 cleared, of a tonnage of 114,699.

Supplies.—Provisions of all kinds are plentiful, but the prices have increased of late years.

The water is procured from wells, and is brackish. The residents collect rain water for their own use. There is a small Government distilling plant capable of supplying the local official needs. Spring water can be obtained in some quantity from Buenavista (Guimaras island), but it is apt to give colic to persons not accustomed to it.

There are also four water tanks, each carrying its own pumps, pumping about 5 tons per hour, which will deliver this water on board for 6s. per ton.

Ice can be obtained, also a limited amount of ship stores.

Coal.—There were 20,250 tons of coal imported in 1909, and 3,800 tons were in stock. About two-thirds the coal was Australian, the remainder being from Japan and Borneo. There are 30 lighters of 25 to 275 tons. Labour is plentiful, and 300 tons can be loaded in 24 hours. The depth alongside river wall is 18 feet. Iloilo is not a coaling port. The coal is kept by firms for their own use only.

Repairs.—**Slip** (*Lat. 10° 42' N., Long. 122° 34' E.*).—A marine and civil engineering works can carry out all ordinary repairs to vessels, and there is a patent slip. See Appendix II.

General charts 2391, 2578, 943, 1263.

Plan of Iloilo river on chart 2391. Var. 1° 10' E.

Pilots.—There are nine pilots for Iloilo. The outer pilot station is south of Kabalik point. Pilotage is compulsory for foreign merchant vessels.

Tugs are generally procurable, and sailing vessels are usually towed out past the Oton bank.

Telegraph.—A submarine telegraph cable connects Iloilo with Manila; there is also a cable between Iloilo and Sebu, &c. *See* page 4.

Communications.—There are two Spanish lines to and from Manila, each line one steamer a week. The China Steam Navigation Company (British), to and from Hong Kong, two steamers a month. North German Lloyd, to and from Singapore, one steamer a month. Indo-China Steam Navigation Company (British) and Peninsula and Oriental Company (British) steamers call occasionally.

The railway line which is to connect Iloilo and Kapiz, a distance of 72 miles, was open at the end of 1909 for a distance of 45 miles from Iloilo, and is expected to be completed shortly. Four mixed trains run daily each way, giving an excellent passenger and fast train service.

Winds and weather.—*See* Meteorological table, page 714.

Port regulations.—*See* page 5.

River Iloilo.—From the town to the sea the river makes two sharp bends, and, flowing with great force to the eastward, enters the sea between two stone jetties, about three-quarters of a cable apart. Retaining walls have been built and the river has been dredged, making a channel 15 feet deep (1910), 2,200 yards long, and from 300 to 400 feet wide, from the Custom-house to the mouth of the river. Dredging is still being carried on, and it is intended to have a depth of 24 feet alongside the river wall. The depth outside the river entrance was 13 feet in 1910. The services of a pilot are necessary to enter the river.

Additional works are proposed for the improvement of the port.

Chart 2391, Iloilo strait.

Anchorage (*Lat. 10° 42' N., Long. 122° 35' E.*).—The best anchorage for vessels unable to enter the river because of their size or the state of the tide is northward of the river entrance, in about 15 fathoms, sand, about a quarter of a mile outside the line of the cable buoys. During strong south-west winds a heavy sea sets in which prevents landing.

Small vessels may find shelter during the N.E. monsoon south-westward of the fort in a depth of $3\frac{1}{2}$ fathoms.

Typhoon signals are shown from the pilot's watch tower in accordance with instructions received from the Manila observatory

General charts 2391, 2578, 943, 1263.

Chart 2391, Iloilo strait. Var. $1^{\circ} 10' E.$

(*see page 6*). Typhoons are not of frequent occurrence, but few years pass without their effects being felt here.

Tidal streams.—In Iloilo strait the velocity of the flood stream averages about 2 knots, but that of the ebb is greater. Off Iloilo river the tidal streams at springs have a maximum velocity of 3 to 4 knots. The flood stream sets north-eastward and the ebb south-westward, following the general trend of the coast. The time of slack varies considerably; in the northern entrance the stream turns at times one hour before high water and runs westward.

Abreast of the fort the eddies are strong and irregular on the flood.

Tides.—It is high water, full and change, at Iloilo, at 11h. 44m.; springs rise $4\frac{1}{2}$ feet, neaps rise 3 feet. At Bondulan point, Guimaras island, at 11h. 20m.; springs rise $5\frac{1}{2}$ feet; and at Kabugao point (*Lat. $10^{\circ} 45' N.$, Long. $122^{\circ} 39' E.$*), Guimaras island, at 11h. 37m.; springs rise $7\frac{1}{2}$ feet.

Directions.—Approaching from the south-westward. *See page 327.*

The approach to Iloilo from the northward and eastward is described at the end of the next chapter. *See page 368.*

General charts 2578, 943, 1263.

CHAPTER VI.

VERDE ISLAND PASSAGE TO ILOILO, EASTERN ROUTE; ROMBLON,
SIBUYAN, AND MASBATE ISLANDS, NORTH AND EAST COASTS
OF PANAY.

VARIATION IN 1911.

Slightly increasing.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

During the S.W. monsoon the eastern route to Iloilo is generally taken, thus:—The Verde island passage is followed as far as Dumali point, and then the route lies east of Maestre de Campo, south of Simara, between Tablas and Romblon; thence to pass 2 miles south of Hintotolo island, and from there down the east coast of Panay to Iloilo.

The islands Maestre de Campo, Hermanas, Simara, and Tablas have been described in the last chapter; it is now intended to describe the islands Romblon, Sibuyan, Masbate west and south coasts, and the islands to the southward of Masbate. Then a description of the north and east coasts of Panay with the adjacent islands will be given, followed by that of the eastern part of Iloilo strait.

The channels.—Between Tablas and Simara the channel is $6\frac{1}{2}$ miles in width, and between the north-east point of Tablas and the islands Cobrador and Romblon $3\frac{3}{4}$ miles wide; both are free from danger. The flood stream sets to the east between Tablas and Simara, and to the south between Tablas and Romblon. The north coast of Tablas is clear and steep-to; the track passes nearly 2 miles outside the islets off the north point mentioned in the last chapter (page 320).

ROMBLON ISLAND (*Lat. 12° 35' N., Long. 122° 16' E.*), 6 miles eastward of the north-east point of Tablas, is hilly, and is composed chiefly of quartz, marble, and slate; it is $8\frac{1}{2}$ miles in length, north and south, and $4\frac{1}{2}$ miles wide. Off its north-west part are the islands Cobrador, Alad, and Lugbung, the last of which lies in front of the small but sheltered port of Romblon.

Cobrador, situated $2\frac{3}{4}$ miles north-west of the northern end of Romblon, is clear and steep-to, except on the south-west part, which

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. is bordered by a reef to the distance of 2 cables. It is about one mile in extent, and rises to a height of about 800 feet.

LIGHT.—A white occulting light every sixteen seconds, thus:—light, twelve seconds; eclipse, four seconds, visible 15 miles in clear weather, is exhibited, at an elevation of 172 feet above high water, from the top of a concrete house 16 feet in height, situated on the western extreme of Cobrador island. For arc of visibility, see Light list and chart.

Alad, three-quarters of a mile from the north-west coast of Romblon, is about $1\frac{1}{2}$ miles in length, east and west, and three-quarters of a mile wide. It is 700 feet high, covered with trees, clear, and steep-to. About $2\frac{1}{2}$ cables south of its southern point (Bombon) is the islet Tinang, consisting of two rocks 30 feet high, on which are some bushes, joined to the point by a rocky reef.

Plan of Port Romblon on 972.

Lugbung island is $1\frac{1}{2}$ miles long north-north-east and south-south-west, narrow in the middle, but wider at the ends, on each of which is a hill 300 feet high. It is fringed with reefs, which from the northern point extend $1\frac{1}{2}$ cables and from the south-west point $1\frac{1}{2}$ cables.

The passages formed by Alad and Lugbung islands with Romblon are of great depth with rocky bottom; the widest and best is the northern passage between Alad and Romblon, which is 8 cables in width.

Bangud islet, 175 feet high, lies 8 cables southward of Lugbung and $2\frac{1}{2}$ cables south-westward from Bombon point on Romblon island, with which it is connected by a reef.

Currents.—The currents in these channels are strong, and care must be taken to keep in mid-channel; the flood tide sets to the south and the ebb to the north.

PORT ROMBLON (*Lat. 12° 35' N., Long. 122° 16' E.*), between Sabang and Rosas points, is separated into two parts by Agbatan point. All these three points send out reefs which, under favourable conditions of sunlight, may be easily distinguished by the whitish appearance of the water; that from Sabang projects 4 cables in a S.W. by S. direction; that from Agbatan 2 cables to the west, and that from Rosas and Binagon, the next point further in, to about $1\frac{1}{2}$ cables to the northward.

On the hill side, about 2 cables north-east of the landing place at Romblon and at a short distance back from the shore, there is a conspicuous limestone rock, at an elevation of about 150 feet.

General charts 2577, 943, 1263.

Plan of Port Romblon on 972. Var. 1° E.

LIGHTS.—A *white fixed* light, elevated 116 feet above high water, and visible 10 miles in clear weather, is shown from a small white concrete tower, 18 feet high, erected at a distance of $1\frac{1}{2}$ cables within the extremity of Sabang point (*Lat.* $12^{\circ}36'N.$, *Long.* $122^{\circ}17'E.$).

A *red fixed* light is exhibited from the beacon on the extremity of the reef off Agbatan point.

A *green fixed* light is exhibited from the beacon on the extremity of the reef off Binagon point.

Beacons.—The reef off Sabang point is marked near its extremity by a square white concrete beacon, 2 feet across at the top, standing about 9 feet above high water. It is situated $3\frac{1}{4}$ cables S. 37° W. from Sabang point.

A square white concrete beacon, 2 feet across at the top, standing about 8 feet above high water, marks the extremity of the reef off Agbatan point. It is situated $1\frac{3}{4}$ cables S. 86° W. from the point.

A pole beacon, surmounted by a shape 6 feet square, painted white with a red 2-foot square in the centre, is situated on a concrete base near the extremity of the reef off Binagon point, at a distance of $1\frac{1}{4}$ cables N. 17° W. from the point.

Leading beacons.—Two wooden beacons, surmounted by white triangular topmarks, have been established. The front beacon stands in the water at a distance of $1\frac{3}{4}$ cables N. 15° E. from Port Romblon pierhead; the rear beacon on the shore three-quarters of a cable S. 68° E. from the front beacon. These two beacons in line lead between the reefs into the harbour.

Anchorage.—The northern port is $4\frac{3}{4}$ cables in width between Sabang and Agbatan points, but only from $1\frac{1}{4}$ to $3\frac{1}{4}$ cables wide between the reefs that line the interior; the depth close off these reefs is from 6 to 16 fathoms, the depth of the middle of the bay is from 20 to 27 fathoms, rocky bottom; the entrance between the extremities of the reefs projecting from the above points is $2\frac{1}{4}$ cables wide and 28 fathoms deep. The anchorage in the southern port is only $1\frac{1}{4}$ cables wide, but is as sheltered as a basin. The general depths are from 14 to 18 fathoms, mud, in the centre.

Directions.—Vessels bound into Romblon should bring the leading beacons into line and steer for them, giving the beacons on the reefs off Agbatan and Binagon points a berth of about 150 yards. When abreast of Binagon beacon, haul to the southward and proceed to the wharf, or anchor in 14 to 18 fathoms. In the absence of the leading beacons the conspicuous limestone rock mentioned above bearing E.S.E. leads to the entrance to the southern port.

General charts 2577, 943, 1263.

Plan of Port Romblon on 972. Var. 1° E.

The town of Romblon is near the beach at the bottom of the port, and carries on a trade in cocoanut oil. It had a population of 10,095 in 1903.

Telegraph.—Cables are laid from Romblon to Boak and Palanog.

Supplies.—Cattle are plentiful; and excellent water can be obtained from a pipe on the wharf.

Tides.—It is high water, full and change, at Port Romblon, at 10h. 41m.; springs rise $4\frac{1}{2}$ feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—From the little islet, Bangud, the coast runs $2\frac{1}{2}$ miles to the southward, forming three bays; the first two are foul, but in the last and most southern one, which is one mile wide and half a mile deep, there is anchorage in a depth of from 6 to 10 fathoms at a distance of one cable from the shore.

From the southern point of this bay, San Pedro point, the coast trends to the south-south-east for 2 miles to the south-west point of the island, forming two bays; the northern of these is shallow, and appears to be foul; the southern bay has a depth of 5 fathoms at one cable from the beach.

From the south-west point of the island, round the south to the east, the shore is clear and very steep, with depths of 87 and 73 fathoms near it. North of Kabog point on the east coast is a bay with a small islet near its south point, a reef running across the entrance. The east and north-east shores are clear, and, like the whole coast of this island, can be approached to the distance of half a mile.

SIBUYAN ISLAND (*Lat. $12^{\circ} 25' N.$, Long. $122^{\circ} 35' E.$*) is mountainous, and rises in the centre to a peak 6,424 feet high, visible at the distance of 75 miles in clear weather; this peak is named Mount Sibuyan. The island is about 17 miles in length, north-west and south-east, and $9\frac{1}{2}$ miles broad, and is situated south-eastward of Romblon, from which it is separated by a deep channel 6 miles wide. The mountains are covered with forests of hard wood, and the soil in the low lands is extremely fertile. The north coast is bordered by rocks, and the north-east part is fringed by a bank of sand and stones to a distance of nearly 2 miles; but from the east point round to the southward, and along the south shore, it is clear of all dangers, and presents sand beaches, off which there is good anchorage.

Coast.—Kadodiangan point is the western extremity of the island; from it the coast trends south-south-east 3 miles to Bolabok point, and then south-east $8\frac{1}{2}$ miles to Kantingas point, forming a bend two miles deep, into which flow several streams and the River España.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. This river, though it has a depth of 2 fathoms inside at low water, has only $1\frac{1}{2}$ feet on the bar, which therefore can only be crossed at high water. The shore of this part of the coast is of coarse sand, and the depths are 4 to $6\frac{1}{2}$ fathoms at one or 2 cables from it, increasing quickly to 50 fathoms and upwards at the distance of 2 miles.

Kantingas point is low; there are rocky patches north-west and south-east of it near the coast, covered by $1\frac{1}{2}$ to 3 fathoms water, with depths of 6 and 7 fathoms near; the chart shows a shoal at one mile north-west of Kantingas point, and three-quarters of a mile from the coast. Vessels of large draught should not approach the shore closely here.

Pagalad (Pagalak) is a small town, situated in a beautiful valley between three hills; a reef of small extent lies in front of the town, and to the west of it is a sandy point, with a depth of 5 fathoms near the shore.

Kauit point (*Lat. 12° 16' N., Long. 122° 39' E.*), the south extreme of Sibuyan island, is a tongue of coarse sand, low and flat; on its western side, very near the shore, is a small ledge of rock with a depth of $2\frac{1}{4}$ fathoms at 2 cables from it. The town of Kauit is situated on the tongue of sand. The town of San Fernando is situated between Pagalad and Kauit point.

Anchorage.—Between the towns of Kauit and of Pagalad to the north-west there is anchorage in a depth of 6 fathoms, sand, sheltered from north-east winds.

Prueba bank, lying one mile south of Kauit point, extends $2\frac{1}{2}$ miles to the south, and is one mile wide at the northern end, where the depth is 3 feet, which increases to 6 fathoms towards the southern part. The depths round its edge are from 11 to 16 fathoms, and in the channel between it and Kauit point 20 to 25 fathoms.

East coast of Sibuyan.—From Kauit point, the coast to the northward and eastward for about 7 miles to Kajidiokan point is sandy and clear, with depths of 45 fathoms generally at a distance of half a mile.

Kajidiokan point is low, sandy, and well defined. The town of Kajidiokan is situated in a picturesque valley. Its population is occupied with agriculture and fishing. Cattle are cheap and plentiful, and water can be obtained from the river. There is anchorage before the town for vessels of all sizes during the S.W. monsoon.

Kambulayan point, the eastern point of the island, rocky and wooded, is steep with a flat crown of moderate height. The depths off it are 4 fathoms at a distance of 2 cables, and, as on all the south-

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. east part of the coast, the 100-fathoms contour line lies distant less than a mile. The Kambulayan river, southward of the point, has 3 feet on the bar, and deeper water inside, where there are fine tracts of level cultivated ground.

N.E. reef of Sibuyan is a dangerous bank of sand and stones, which extends from near Kambulayan point to Konloai point, 7 miles to the north-west. It is separated from the coast by a channel half a mile in width, and with depths of from $3\frac{1}{4}$ to 25 fathoms; the shore is covered with mangroves and fringed with rocks.

The bank is half a mile wide, and has a general depth of about 4 feet, with many rocks that uncover at low water, deepening at its ends to $2\frac{1}{2}$ and 5 fathoms; there is deep water close to its outer edge. There is a gap in the middle of the reef, opposite the town of Lubug.

Konloai point is low, covered with mangroves, and fringed with reef which extends out half a mile, and has 6 fathoms on its edge.

Off Konsumala point, 5 miles westward, the coast reef extends out one mile, with depths of $4\frac{1}{4}$ to 9 fathoms on its edge.

Shoals.—A rocky shoal, with a depth of 3 feet and 2 cables in extent, lies $1\frac{1}{2}$ miles westward of Konsumala point. About one mile north-eastward there is another rocky shoal, 4 cables in extent, lying $1\frac{1}{2}$ miles north-north-westward from Konsumala point, which has been but partially examined, and should be given a berth; a depth of $6\frac{1}{2}$ fathoms was found just north-eastward of it. Between the southernmost shoal and the town of Magallanes the depth is 12 fathoms.

Magallanes bay and town (*Lat. 12° 30' N., Long. 122° 31' E.*).—The bay is small and open between Points Konsumala and Kangouak. The River Nailog flows into it, and on its left bank lies the town of Magallanes, which is the only open coastwise port on the island. On the bar of the river there is generally a depth of 2 feet, and within it of 8 feet; during the S.W. monsoon freshets from the river shift the bar, and increase the depth.

Anchorage can be had in depths of 3 to 9 fathoms in the corner formed by Kangouak point, care being taken to avoid a rocky ledge that projects eastward from it.

Coast.—From Kangouak point to Kadodiangan point, the coast is steep-to, with a depth of 12 fathoms near the shore. Ipil point is of moderate height and remarkable by a little flat crown of red earth.

The entire coast of Sibuyan can be approached to a distance of one mile from it, except on the northern and north-eastern parts, where it must be given a berth of at least 3 miles.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

CHANNEL BETWEEN SIBUYAN and MASBATE.

—This channel, about 30 miles in width, contains several dangers, which are situated on two lines stretching about north-east and south-west. They are all surrounded by deep water, and the lead gives no warning of their vicinity; but in daytime they can generally be seen at the distance of 2 miles.

The western line of these shoals is about 6 miles from the coast of Sibuyan, and contains the following:—

Cervera bank, the northernmost, is 2 miles in extent, with a least depth of $1\frac{3}{4}$ fathoms; from the shoalest part the S.E. peak of Sibuyan bears W. $\frac{1}{4}$ S.

One mile east of Cervera is Seco bank, 4 cables in length, north and south, and narrow, with a sandbank on its centre, 5 feet above water. A depth of $2\frac{3}{4}$ fathoms is charted just eastward of Seco bank.

Perseus bank is half a mile in extent, and has on it a rock covered by 3 feet least water. From it the south-east peak of Sibuyan bears N. 72° W.

Roda shoal is rocky, one-third of a mile in extent, and has a depth of $2\frac{3}{4}$ fathoms on its shallowest part. From it Kaut point bears W. $\frac{1}{2}$ N., distant 8 miles.

Aubarede shoal is small, with a least depth of $4\frac{1}{2}$ fathoms, sand and rock. From it Cresta de Gallo bears S.W. by S., distant $2\frac{1}{2}$ miles.

Cresta de Gallo (Cock's Comb), islet (*Lat. $12^\circ 12'$ N., Long. $122^\circ 42'$ E.*) and reef.—The islet, lying 6 miles S.E. $\frac{3}{4}$ S. from Kaut point, is low and partly covered with trees, but rises to several little peaks along the length of its outline of three-quarters of a mile; it is conspicuous and forms an excellent mark. A ledge of sand and rock, which sometimes uncovers, projects half a mile from its north end.

The islet stands a mile within the north end of a reef, about one mile in width, and extending $4\frac{1}{2}$ miles in a south-south-west direction: the depth on the northern edge is $3\frac{1}{4}$ fathoms and on the southern $5\frac{1}{2}$ fathoms, sand and stones, increasing abruptly to more than 50 fathoms at a short distance.

The channel between Cresta de Gallo and Prueba bank is 3 miles wide and clear of dangers.

Romero shoal, a detached patch of $2\frac{3}{4}$ fathoms, sand and rock, nearly one mile in extent, lies 2 miles south-eastward of Cresta de Gallo; the channel between them is 39 fathoms deep.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

On the eastern line of shoals are the following:—

A shoal of small extent and covered by an estimated depth of 4 fathoms, reported 1908, has been placed on the chart in the southern approach to Bugui point, with Gato island S. 40° E., distant 4 miles.

Bennet bank is one mile in extent, having on its middle part a narrow bank of sand 10 feet above the sea, with some vegetation on it. From its centre, Gato island bears E. by N. $\frac{1}{2}$ N., distant $7\frac{1}{2}$ miles.

Montero shoal, 7 miles S. 24° W. of Bennet bank, is 3 cables in extent, and has a rock on it covered by $1\frac{1}{2}$ feet of water. From it Gato island bears N.E. $\frac{1}{4}$ E., distant $13\frac{1}{2}$ miles.

LAS LLAGAS.—Pineda shoal (*Lat. 12° 13' N., Long. 122° 59' E.*) is half a cable in extent, and has $1\frac{1}{2}$ fathoms, least depth, on it. From the shoal Gato island bears N. 46° E., distant 19 miles.

Arana, $2\frac{1}{2}$ miles south-west of Pineda, is a dangerous rock half a mile in extent, with 3 feet least water over it.

Reynoso bank is 4 miles S. 41° W. from Arana, and is the southernmost of the dangers in this vicinity; it is half a mile in extent, and with $3\frac{1}{4}$ fathoms least depth, lies about midway between Kauit point and Hintotolo point, Masbate, from which it is distant $18\frac{1}{2}$ miles.

Roldan shoal, $4\frac{1}{2}$ miles W.N.W. of Pineda, is half a mile in extent, and covered by three-quarters of a fathom water.

Carrasco bank, 2 miles south of Roldan, is half a mile in extent, and has $2\frac{3}{4}$ fathoms least depth.

These five shoals are included within a dotted line on the chart under the general head of Las Llagas; there appears to be deep water around and between them.

Directions.—To proceed through this channel, a vessel should pass either between Sibuyan and the western line of shoals, or between Masbate and the eastern line. Both routes are easy and direct, even at night, when the land can be seen; but a good look-out should be kept from aloft.

From the northward.—The N.E. reef of Sibuyan should be passed at a distance of 3 miles, and from a position 2 miles east of Kambulayan point a S. by W. $\frac{3}{4}$ W. course will lead between Prueba bank and Cresta de Gallo islet; when that little islet bears N.E., distant 5 miles, a course can be steered S.E. by E. to pass between Hintotolo island and the Zapatos.

If the channel near the coast of Masbate be taken.—Avoid the 4-fathoms shoal situated 4 miles N. 40° W. from Gato island, and when that island bears east 3 miles, a S. by W. course for the island

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. Zapato Mayor will lead clear of all dangers, until Hintotolo island bears East 4 miles.

From the southward these directions should be reversed.

Currents are not strong in the channel; the flood tide coming from the north meets in mid-channel that coming from the south, and they counteract each other.

MASBATE ISLAND, situated southward of the south-east part of Luzon, is the eleventh island of the Philippines in point of size, having an area of 1,236 square statute miles. It is irregular in shape and very mountainous, there being a high central chain which follows a semicircular direction and terminates at the south-west and south-east points of the island, throwing out spurs north-westward, which go to form Bugui point. The highest point of the island is probably about 19 miles south-eastward of Bugui point, where there is an elevation of 2,073 feet. The island is well wooded and watered, and in the south-eastern part there are extensive grazing lands. The island is sparsely inhabited, having, according to the last census, a population of only 29,451. The towns are small and of little commercial importance.

Chart 3369, Luzon island to Masbate island, &c.

West coast.—Bugui point (*Lat. 12° 36' N., Long. 123° 15' E.*), the northern extremity of Masbate, is moderately high, rugged, and steep-to, and can be passed close-to in 7 or 8 fathoms. *See view a*, at page 536.

LIGHT.—From a white cylindrical tower 48 feet in height, with dwelling attached, situated near the extremity of Bugui point, at an elevation of 219 feet above high water, is exhibited an *alternating group flashing red and white light*, with a period of *ten seconds*, showing thus:—*red flash; eclipse, four and a quarter seconds; white flash; eclipse, one and a half seconds; white flash; eclipse, four and a quarter seconds*, visible 22 miles in clear weather. For arc of visibility, *see* Light list and chart.

Coast.—From Bugui point to Bagupantao point, 9 miles to the southward, the coast is high; the depths off it at half a mile distant are from 4 to 9 fathoms until within $2\frac{1}{2}$ miles of Bagupantao point, where $2\frac{3}{4}$ fathoms are found at one mile off; a little out they are from 10 to 15 fathoms. There is anchorage for coasters in a little bay south-east of Bagupantao point in a depth of $4\frac{1}{2}$ fathoms.

Gato island, $2\frac{1}{2}$ miles west-south-west of Bagupantao point, is a fine natural mark rising steeply from the water on all sides to a height of about 350 feet; between it and Majaba island on the coast

General charts 2577, 943, 1263.

Chart 3369, Luzon island to Masbate island, &c. Var. 1° E.

the depth is 12 fathoms, and there is a clear, deep channel between it and Bennet bank. For 4-fathoms shoal north-westward of the island, see page 343.

Coast.—From Bagupantao point to Mariveles point, 13 miles to the southward, the coast is somewhat lower, and forms bays of no importance, and of little depth of water, fronted by the islets Majaba, Nabugtut, Bagunbanua, and Napayauan. Near these islets, on the outside, the depth is $2\frac{3}{4}$ to 7 fathoms, which increases seawards.

Tumalaytay islet, one mile west of the point of the same name, is small and wooded, and connected with the land by a strip of sand; the depth at half a mile outside it is 16 fathoms. Between this islet and Napayauan, $3\frac{1}{2}$ miles northward, a ledge of sand projects from the coast, but does not extend beyond the line of islands; there is a depth of 3 fathoms on its outer edge.

Gay shoal.—A small coral shoal, covered by $4\frac{1}{4}$ fathoms, with depths of 7 to 10 fathoms around, is charted W. by N. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from Pagbulungan point, with Kamasusu island bearing S.E. $\frac{1}{2}$ S. The position is doubtful. Between the shoal and the coast the depth is 15 fathoms.

Plan 977, Nin bay and Port Mandaon.

NIN BAY (Lat. $12^{\circ} 12' N.$, Long. $123^{\circ} 15' E.$), lying southward of Pagbulungan point, with the islets Kamasusu and Karogo or Puro forming its south side, falls back north-eastward about 4 miles from its entrance, which is 3 miles wide. The bay is well sheltered from all winds but those from S.S.W. to West, and the holding ground is good; the depth in the centre of the bay is 6 to 7 fathoms, lessening gradually towards its head. The small interior port of Mandaon, where small vessels can anchor in 2 to 4 fathoms, mud, lies on the eastern side of the bay, and is approached by a narrow channel after crossing a broad flat upon which the depth is 2 fathoms.

The little town of Mandaon is situated on the narrow peninsula that separates Nin bay from the inner port; it has few inhabitants and no resources.

Water can be obtained from a rivulet on the north shore.

Nin banks are two shoals lying near the centre of the entrance to Nin bay; they are together about half a mile in extent E.N.E. and W.S.W., and 2 cables across, but are separated from each other by a depth of 9 fathoms. Romulus, the eastern bank, lies $1\frac{1}{10}$ miles S. by E. $\frac{1}{2}$ E. from Pagbulungan point, and has a general depth of $1\frac{1}{4}$ to 2 fathoms, rock; Argos, the western and smaller bank, has a least depth of $4\frac{1}{4}$ fathoms. The entrance to the bay is between these banks and the northern shore, which is clean and fairly steep-to.

General charts 2577, 943, 1263.

Plan 977, Nin bay and Port Mandaon. Var. 1° E.

Ochoa, Sostoa, and Ponte banks are three detached banks, the first and third about 2 cables and the second about one cable in extent, lying on the southern side of Nin bay between Nin banks and Karogo island; Ochoa, the westernmost, is situated N. $\frac{1}{2}$ E. $1\frac{2}{10}$ miles from the peak of Kamasusu and has a least depth of one fathom; Sostoa has 2 fathoms, and Ponte 3 feet at low water.

A small patch of $3\frac{3}{4}$ fathoms lies N.E. by E. $\frac{1}{2}$ E., distant 4 cables from Ochoa bank.

Variation.—The Spanish survey of 1895 calls attention to the abnormal value of the magnetic declination in the centre of Nin bay, on the shores of Kamasusu and Karogo islands, and the peninsula south-east of the bay. This effect is diminished to the northward and southward. The variation given on the U.S. plan in above locality is $3^{\circ} 47' E.$

Tides.—It is high water, full and change, at Nin bay at 11h. 58m.; springs rise 9 feet.

Kamasusu islet (*Lat. $12^{\circ} 10' N.$, Long. $123^{\circ} 13' E.$*), at the south-western point of Nin bay, is about half a mile in length, and rises from all sides to a central peak, 522 feet in height, which forms a good landmark. It is clean and safe, and may be rounded close-to. The channel between Kamasusu and Karogo is $1\frac{1}{2}$ cables wide and 7 fathoms deep.

Loog bay lies between Kamasusu and Karogo islands to the north, and the mainland of Masbate to the south; it is about 4 miles in length and from one to $1\frac{1}{2}$ miles wide, but is much narrowed by reefs projecting two-thirds of a mile from the southern shore, and by Tandao bank of 3 to 6 feet, extending nearly a mile northward from Talisai point. The depth at the entrance of Loog bay is 8 fathoms, decreasing to 5 fathoms when eastward of Kamasusu, and to less than 3 fathoms inside Kabug point.

Chart 2577, Between San Bernardino and Mindoro straits.

The coast, from Nin bay to Hintotolo point, 13 miles south-south-west, is steep and clear, with depths of $3\frac{1}{4}$ to 7 fathoms at the distance of half a mile.

Hintotolo point is low and wooded; 2 miles S.E. by S. of it is Pulanauta (Pulanduta) point, the extreme south-west point of Masbate island; both points are clear with depths of $4\frac{1}{2}$ to 7 fathoms at a short distance.

Anchorage.—To the eastward of Pulanauta point there is anchorage in a depth of $5\frac{1}{2}$ fathoms, sand, but care must be taken to avoid a patch of $5\frac{1}{2}$ fathoms that lies E. by N. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from the point and 2 miles off-shore.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

HINTOTOLO ISLAND, $3\frac{1}{2}$ miles south-westward of Pulanauta point, is 2 miles long, north and south, and $1\frac{1}{2}$ miles wide; it is 120 feet high, well wooded, with a beach of sand, and is surrounded by a reef which extends about three-quarters of a mile on its east and west sides. The channel that separates it from Pulanauta point is clear, with a depth of 13 fathoms in the middle. *See view a*, at page 352.

LIGHT (*Lat. 11° 51' N., Long. 123° 7' E.*).—An alternating flashing light, showing a white and a red flash alternately every ten seconds, thus:—white flash; eclipse, ten seconds; red flash; eclipse, ten seconds, is shown, at an elevation of 187 feet above high water, from a grey square stone tower 51 feet high, with a dwelling attached, situated on the southern and highest point of Hintotolo island; it is visible 17 miles in clear weather.

This lighthouse is a conspicuous landmark that can be seen from any direction, and shows before the island itself is visible.

Elcano shoal, $4\frac{1}{2}$ miles in length east and west, and narrow, with depths of $5\frac{1}{2}$ to 10 fathoms, is of importance as lying close to one of the most frequented routes of the Archipelago. From the position in $5\frac{1}{2}$ fathoms at its east end, Zapato Mayor bears S. 24° E., distant $8\frac{1}{2}$ miles. No close examination has been made of this shoal.

Circe bank, lying $6\frac{1}{2}$ miles E. by S. of Pulanauta point, has depths of $3\frac{1}{2}$ and $6\frac{1}{2}$ fathoms on it; it is about 2 miles in extent, north and south, as charted, and is steep on its southern side.

SOUTH COAST of MASBATE.—**Asid gulf**, which forms the south coast of Masbate, is included between Pulanauta point to the west and Buri point distant 33 miles to the east, and is 18 miles deep to the northward. The western shore is clear, but the greater part of the gulf is filled by islets and shoals; *see* the chart.

From Pulanauta point the coast trends in a north-east direction for about $26\frac{1}{2}$ miles, and thence it curves eastward and south-eastward for 22 miles to Buri point. From Pulanauta point to Kalumpan point the coast is clear and bold; thence to Balabao point it is bordered by a reef extending 2 miles from the shore in some places. A rock with less than 6 feet on it lies $1\frac{1}{2}$ miles off-shore at about 13 miles north-eastward of Pulanauta point.

Chart 3369, Luzon island to Masbate island.

Milagros.—Telegraph cable.—Milagros is a small open coastwise port and telegraph station at the head of the gulf. The cable from Kapiz, Panay, lands on the beach in front of the municipal building.

Chart 2577, Between St. Bernardino and Mindoro straits.

Naguran islet, in the centre of the northern part of the gulf, is small, and surrounded by a narrow reef. At one mile south and at 2 and at 5 miles south-west of it there

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. are shoals that uncover in parts, with a depth of 7 to 8 fathoms separating them, and with this depth also between them and the coast. There is a shoal with $2\frac{3}{4}$ fathoms on it lying $2\frac{1}{2}$ miles north-west from Naguran and 2 miles from the coast. A chain of five shoals extends from 4 to 12 miles south-westward from Naguran; the northern has $2\frac{3}{4}$ fathoms on it, the next is awash, the southern has $1\frac{1}{4}$ fathoms, and the others less than 6 feet on them.

From Naguran islet a chain of islets and shoals extends south-eastward in the general direction of the coast, extending a distance of 13 miles from the shore and from Buri point, in a south-westerly direction towards the banks north-east of the Gigantes group. It is probable that there are yet other reefs besides those marked on the chart; it would therefore be prudent to exercise the greatest care in navigating this sea, and to keep a good look-out from aloft.

Guinlabagan and Gilutugan islets are both situated on circular reefs $1\frac{1}{2}$ miles in diameter, and between them are three smaller islets, with rocks about them; the depth of water between the islets is $2\frac{3}{4}$ to $5\frac{1}{2}$ fathoms, and between them and the coast 7 fathoms.

Two miles N.N.W. of Guinlabagan there is a group of rocks, and N.E. by N. from the islet, $1\frac{1}{2}$ miles off Balabao point, a small shoal; a sunken rock lies about 4 miles westward of Guinlabagan, and a shoal of sand and rocks $1\frac{1}{2}$ miles in extent, and covered by $3\frac{1}{4}$ fathoms water, lies $4\frac{1}{2}$ miles south-west of Gilutugan. S. 6° W. from Naguran there is a rock awash at low water, called Burnside shoal, from which Guinlabagan island bears N. 63° E., distant $5\frac{1}{2}$ miles. A rock awash lies about a mile northward of Burnside shoal, and at about one, 3, and 4 miles southward of the latter are three shoals with $1\frac{1}{2}$, $2\frac{1}{4}$, and 4 fathoms on them, respectively.

Little Naro, one mile in extent, is surrounded by a reef which extends to the distance of one mile. The islets Pobre and Guintubugan, to the north-east and north-west of it, are surrounded by rocks. South-west of it is a shoal 2 miles in extent, east and west, the least depth over which is three-quarters of a fathom, with 6 fathoms a little southward of it. A sunken rock lies 3 miles W. by N. from Little Naro.

Naro island (*Lat. $11^\circ 53'$ N., Long. $123^\circ 41'$ E.*), 2 miles in extent, and of regular height, is surrounded by a reef which extends half a mile to the north and one mile to the south, terminating to the south-west in a shoal of $2\frac{3}{4}$ fathoms, the outer limit of which is 3 miles from the island.

At 3 miles south-eastward of the south point of Naro is the north-west head of a sandbank, which extends $4\frac{1}{2}$ miles to the south-east; the bank is 2 miles wide, and the least depth upon it is $2\frac{3}{4}$ fathoms; depths of $4\frac{1}{4}$ fathoms extend about one mile off the north-east side, and about the same distance off the middle of the south-west side of the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E. bank. From the south end of this bank Kaduruan point bears S. 81° E., and Mount Vigia, North. At one mile East of the south-eastern end of the bank is a patch of $2\frac{3}{4}$ fathoms, with depths of 9 to 18 fathoms around it.

Gorriti, a shoal $1\frac{1}{2}$ miles in extent, north-north-west and south-south-east, with three-quarters of a fathom on it and 7 fathoms around, lies 5 miles S.W. by S. from the south point of Naro.

A shoal about one mile in extent, with a depth of $3\frac{1}{2}$ fathoms over it, lies in the entrance to Asid gulf, $3\frac{3}{4}$ miles westward of Gorriti and 8 miles S. 62° W. from the south point of Naro, and at about a mile northward of the above is another shoal of $3\frac{1}{4}$ fathoms.

Nabugtut and **Nagarao**, like all the other islets, are surrounded by reefs; from the latter a tongue of sand projects 2 miles to the south, with a depth of $1\frac{1}{2}$ to 2 fathoms on it, and $5\frac{1}{2}$ fathoms off the southern end.

Guinauayan islet, lying 10 miles north-westward of Kaduruan point and $2\frac{1}{2}$ miles off-shore, sends out a reef from its east side to the distance of 2 miles, with a width of half a mile, beyond which shoal water extends three-quarters of a mile in the same direction.

Coast.—Mount Vigia, on the Masbate coast, north-east of Naro island, is a remarkable high hill, the rounded base of which is called Buri point. The point is surrounded by rocks, which, continuing to the north-westward, form a reef covered by $2\frac{3}{4}$ fathoms water, reaching as far as Balabao point, a distance of 11 miles; this reef, extending off the coast to $3\frac{1}{2}$ miles, entirely surrounds Piña island. From Mount Vigia to Kaduruan point the distance is 23 miles S.E. by E.; a small shoal lies $1\frac{1}{2}$ miles south-south-eastward of Buri point; from Daraga to Nauka point, which is surrounded by a reef, a bank with $2\frac{1}{4}$ fathoms on it extends off $1\frac{1}{2}$ miles; the depth off it is $4\frac{1}{4}$ fathoms, and the centre part of the bight between Nauka and Kaduruan points is fronted for a distance of 5 miles by a bank with 3 feet to $2\frac{3}{4}$ fathoms on it, which extends from one to $1\frac{1}{2}$ miles from the land and nearly joins the shoal water off the eastern end of Guinauayan islet.

The towns of Guion, north of Mount Vigia, and of Daraga, north of Nauka point, are of but little importance. Placer is a small coastwise port situated on the south side of Nauka point.

Kaduruan point (*Lat. 11° 43' N., Long. 124° 4' E.*), the south-east extremity of Masbate island, is long and sharp; depths of $4\frac{1}{4}$ and $5\frac{1}{2}$ fathoms extend half a mile off the point.

Var. 1° 10' E.

ISLANDS SOUTH of MASBATE.—The Manokmanok isles are a group of three islets situated 8 miles S. $\frac{3}{4}$ W. from Kaduruan
General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E. point; they lie in a general north and south direction, the southernmost and highest being 54 feet high. North of the islets the depth of 12 fathoms has been obtained at the distance of $1\frac{1}{4}$ miles, shelving gradually to 7 fathoms at 4 cables, bottom hard sand and boulders. At half a mile westward of the islets the depth is 7 fathoms, and at the same distance south-south-eastward 9 fathoms. At $1\frac{3}{4}$ miles eastward the depth is 12 fathoms, south-eastward of which tide rips are shown.

Karnasa island, 4 miles S.E. by S. of Manokmanok, is a flat island, 140 feet high, $1\frac{3}{4}$ miles long and half a mile wide, with three pointed rocks, one of which is named Maria islet, 58 feet high, at the distance of one mile from its south-east part. There are depths of 9 and 10 fathoms between Karnasa and Manokmanok.

Gato islet, lying $9\frac{3}{4}$ miles north of the nearest part of Sebu island, is small, 321 feet high, pyramidal in shape, and steep-to; it has a depth of 10 fathoms close to on the east side, and there is a clear passage between the islet and the island Malapascua, $7\frac{3}{4}$ miles south-eastward, with a patch of 7 fathoms near the centre.

Tanguingui islet, situated 22 miles S. 65° E. of North Gigante lighthouse, is flat, with a few low bushes on it, and two low houses, the roofs of which, 32 feet above the sea, are the highest mark on the island; it is fringed by a sand beach. The water is shoal in its vicinity, and at about $1\frac{1}{2}$ miles westward of it the depth is $6\frac{1}{2}$ fathoms. *See view c, at page 352.*

LIGHT.—A *white group flashing* light, showing *two flashes every ten seconds*, visible 17 miles in clear weather, is shown, at an elevation of 129 feet above high water, from a black steel tower, 113 feet high, with white-roofed dwelling at its base, on Tanguingui island. The eclipse between flashes is *two and a half seconds*, and between groups *seven and a half seconds*.

Shoals.—A bank of coral, covered by $1\frac{1}{2}$ fathoms least water, lies 5 miles south of Tanguingui, about midway between Tanguingui and the north point of Bantayan island; it is about $1\frac{1}{2}$ miles in extent.

NORTH and EAST COASTS of PANAY ISLAND.

—**Potol point** (*see* page 323) is flat and sandy, with a few trees on it; eastward of the point, less than a mile distant, are some rocky islets; small craft can pass between them and the coast at high water. Outside the islets are sunken rocks.

Coast.—From Potol point, the general trend of the coast is approximately E. by S. $\frac{1}{2}$ S. for 73 miles to Bulakau point, the north-east extreme of Panay island; the shore is for the most part sandy, and the coast in its neighbourhood low.

Sabonkogon point (*Lat. $11^{\circ} 55' N.$, Long. $122^{\circ} 0' E.$*), $3\frac{1}{2}$ miles east of Potol point, with which it forms a small bay, is high and

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ}10'E$. clear, and can be approached to within a short distance; from it to within $1\frac{1}{2}$ miles of Ibahay point, 11 miles S.E. by E. $\frac{1}{2}$ E., the shore is clear and steep.

Ibahay point is sandy and flat, and on it is the town of the same name; north-east of the town there is good anchorage sheltered from southerly winds, but as during the S.W. monsoon the wind often veers suddenly to N.W., and Pontud bank would then be to leeward, a large vessel could not remain here with safety.

Sigat point, $3\frac{1}{2}$ miles eastward of Ibahay point, and **Apga point**, $2\frac{1}{2}$ miles farther on, are both high, and Sigat point is fringed by reef to the distance of one cable, with a depth of 8 fathoms at the edge. Between these points there is a little bay, open to the north, and fronted by Pontud bank; the depths in it range from 7 and 11 fathoms, coarse sand, between the points, to 2 fathoms, sand, near the beach.

Pontud banks.—The south-east extremity of these banks is about $1\frac{1}{2}$ miles north-north-east of Apga point, whence they extend 3 miles to the north-west with a width of $1\frac{1}{2}$ miles. The banks are three in number, on the south-western and smallest of which the depth is half a fathom, sand and stones; $5\frac{1}{2}$ fathoms, coral, on the south-east bank, and $3\frac{1}{4}$ fathoms, sand and stones, on the north-west bank, with 8 fathoms near the northern edge, outside of which the depth rapidly increases to 100 fathoms. The channel between the banks and the coast is clear and deep.

Aklan point and river are 8 miles E.S.E. of Apga point. The point, which is flat, is formed by deposits from the river which flows out to the west of it. On the bar there is ordinarily 5 feet water, and with fresh N.E. winds the sea breaks heavily on it.

Kalibo town lies on the right bank of Aklan river, about $1\frac{1}{2}$ miles from the sea. It is the most important commercial town in Kapiz province, and does all its shipping through the port of New Washington, which is situated about 6 miles from Kalibo on a branch of the sea extending from Port Batan.

Anchorage.—Good anchorage may be had during the south-west monsoon outside of the peninsula on which New Washington is situated. The peninsula at this point is only about $2\frac{1}{2}$ cables wide. See New Washington, page 352.

Plan of Port Batan on 944.

Port Batan (Lat. $11^{\circ} 37' N.$, Long. $122^{\circ} 30' E.$), 10 miles south-east of Aklan bar, is a deep bay surrounded by low land cut into by several large creeks. The entrance between Floripon and Batan (Arenosa) points is open to the N.N.E. and can easily be recognised by Pilot mount, a prominent peak 867 feet high, stated to bear

General charts 2577, 943, 1263.

Plan of Port Batan on 944. Var. 1° 10' E.

S. 8° W. about 6 miles from the bar. Okbok hill, a prominent, steep, rocky mound with a flat top, situated 2 miles to the east of the entrance, on low land near the beach, is another good mark. Floripon (Mantiki) point, the western entrance point to Port Batan, is heavily wooded and steep-to on the eastern side. Both entrance points send out banks in a northerly direction, the one from the west point extends $1\frac{1}{2}$ miles, and has one foot of water on the inner part and $2\frac{1}{4}$ fathoms at the end; the bank from the east point extends 2 miles, and is nearly dry for the inner half of its length, with $2\frac{3}{4}$ fathoms at its outer end. Between these two banks and between the entrance points is a channel about a quarter of a mile wide and 5 to 8 fathoms deep that leads to the interior of the port, which is completely sheltered from wind and sea. The bar fronting this channel has 4 fathoms on it (1910); but it is liable, as well as the banks extending from the entrance points, to shift with the freshets. There are no other dangers than these banks; if the buoys are gone or out of position their limits are indicated by the colour of the water over them. The tidal streams run with considerable velocity in this vicinity; within the port they attain a rate of one knot.

LIGHT (Lat. $11^{\circ} 37' N.$, Long. $122^{\circ} 30' E.$).—A *white occulting light every sixteen seconds*, showing thus:—light, *twelve seconds*; eclipse, *four seconds*, visible 10 miles in clear weather, is exhibited, at an elevation of 27 feet above high water, from a white concrete house 24 feet high, situated on Floripon (Mantiki) point. For arc of visibility, see Light list and plan.

Buoys.—The channel into Port Batan is marked by two red conical buoys, Nos. 2 and 4, and one black can buoy, No. 1.

A black can buoy has been placed at the entrance to the Lagatic river, close northward of 6-foot shoal on southern side of river entrance, at a distance of $14\frac{1}{4}$ cables S. 88° W. from Floripon point lighthouse. Vessels entering the river must leave this buoy close-to on the port hand.

Anchorage.—The best anchorage inside is in a depth of from 5 to 7 fathoms anywhere southward of the peninsula which forms the north side of Port Batan.

Batan.—The village of Batan, situated on the eastern shore of the port, is in ruins, only a few nipa houses being visible from the water.

New Washington, formerly Lagatic, is situated about 6 miles north-west of Batan. There are a number of warehouses and two wharves here. It is reported that a depth of 12 feet can be carried from Batan to the wharves. There is regular steam communication

General charts 2577, 943, 1263.



(a)

Hintotolo Island.



(b)

Manigonigo Islet.



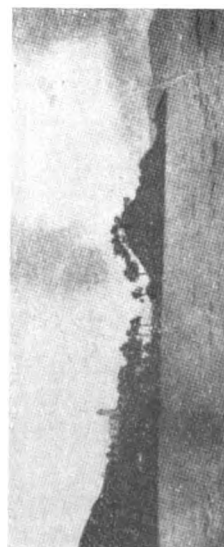
(c)

Tanguingui Islet.



(d)

North Gigante Island, Lighthouse.



(e)

Eastern Calabazas Island, Lighthouse.



(f)

Siete Pecados Islets.

Plan of Port Batan on 944. Var. 1° 10' E.

between New Washington and Manila, and a coastwise trade with Iloilo.

Directions.—Vessels bound into Port Batan should steer for the light on Floripon point on a S. 14° W. bearing, steering between the buoys, keeping a good look-out for the banks and guarding carefully against the effects of the tidal streams. The southern part of Floripon point should be rounded at a distance of $1\frac{1}{4}$ cables, and an anchorage taken up as before described. *See Anchorage.*

Tides.—It is high water, full and change, at Port Batan, at 11h. 21m.; springs rise $5\frac{1}{4}$ feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Shoals.—A coral shoal, about $2\frac{1}{2}$ cables in extent, with a depth of 5 fathoms over it, is situated $5\frac{1}{2}$ miles N. 28° E. from Batan point.

At about $2\frac{3}{4}$ miles northward of Baquiao point, the west entrance point of Sapien bay, there is a shoal of coral and rock, about 3 cables in extent, with a depth of one fathom over it. About midway between this shoal and Baquiao point is another small coral shoal with $2\frac{3}{4}$ fathoms on it; between this shoal and the point the ground is foul.

Sapien bay is 3 miles wide, and the same in length; it is clear, with a depth of $5\frac{1}{2}$ fathoms at the entrance, and 3 fathoms in the centre of the bay, decreasing gradually towards the head. It is sheltered from all winds but those from the northward.

Baquiao point, the west entrance point, about 5 miles eastward from Port Batan, is very foul. Sapien peninsula, on the east side of the bay, terminates in two points $1\frac{1}{4}$ miles apart, Marankalan westward and Nailon eastward.

Mobai islet, about one mile northward of the eastern entrance point of Sapien bay, is a rocky islet, partially wooded, about a cable in extent and 75 feet high. About half a mile north-westward of it is a shoal with $1\frac{1}{2}$ fathoms on it, with a 5-fathoms channel between it and the shoal water off Mobai islet.

Between Mobai islet and the point are some rocky islets with trees on them.

Tuad islet (*Lat. 11° 36' N., Long. 122° 40' E.*), about $1\frac{3}{4}$ miles east-north-eastward of Mobai, is small, partly wooded, and 44 feet high; it lies near the northern part of a shoal of sand and coral heads, which extends about 4 cables southward from it.

Shoal.—A small coral patch, with a depth of 2 fathoms on it, lies three-quarters of a mile eastward of Tuad islet.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.

Kolasi point is high, wooded, and steep, rising quickly to a height of 222 feet.

LIGHT (*Lat. 11° 37' N., Long. 122° 42' E.*).—A *white fixed* light, visible 12 miles in clear weather, is exhibited at an elevation of 157 feet above high water from a white frame, 16 feet high, situated on Kolasi point, north-east side of Kapiz bay. For arc of visibility, see Light list.

Kapiz bay, between Nailon and Kolasi points, is about 4 miles wide and 2 miles deep. The head of the bay is shoal, and the shore is intersected by several streams.

The Panay river, one of the most important rivers in the island, discharges about $1\frac{1}{2}$ miles southward of Kolasi point. The headland forming the northern side of the entrance to the river is high and well wooded; there is an old fort on the top of it, which is 125 feet above the sea and forms a conspicuous landmark. The bar at the mouth of the river is constantly changing, and it is reported that (1906) vessels of 8 feet draught can enter the river at high water and go up to the centre of the town of Kapiz.

Anchorage.—Vessels unable to cross the bar or go to the wharf at Libas anchor about one mile south-westward of Kolasi point, in $3\frac{1}{2}$ fathoms, mud, or closer in if draught will permit. A small coral patch, with a least known depth of 2 fathoms, lies nearly a quarter of a mile south-westward of the lighthouse.

Tides.—It is high water, full and change, in Kapiz bay, at 11h. 29m.; springs rise $6\frac{1}{2}$ feet.

Kapiz.—The town of Kapiz, capital of the province of the same name, is situated on the right bank of the Panay river about 3 miles from its mouth. Kapiz is an open coastwise port, and has occasional steam communication with Manila and Iloilo; the principal articles of trade are rice and hemp. The population of Kapiz in 1903 was 18,525; the town is a telegraph station.

Libas village lies on the south side of Libas cove, a shallow indentation southward of Kolasi point. There is a small wharf here with 8 or 9 feet off it, and a good wagon road from the wharf to the town of Kapiz, 2 miles distant. The channel leading to the wharf through Libas cove is narrow and tortuous.

Nipa point, about 6 cables eastward of Kolasi point, is steep and rocky, and rises to a height of 90 feet. The cove between the two points has a sandy beach and large cocoanut trees at either end. Kolasi hill, behind Nipa point, rises to a height of 340 feet, and the foot of it comes to the water's edge, midway in the cove just mentioned.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E.

Rocks.—A rock, with $4\frac{3}{4}$ feet on it at low water, lies N. 64° W. half a mile from Nipa point. A large flat rock about 50 yards in diameter lies half a mile northward from Nipa point. It is about one foot above the surface at high water, and is surrounded by rocks awash at high water. Midway between this rock and the shore are other rocks awash at high water.

Coast.—From Nipa point to Pirara point, $7\frac{1}{2}$ miles eastward, the coast is flat with long sand beaches fringed with cocoanut trees and nipa houses. The cable hut where the cable from Milagros, Masbate, lands, is a low, square, brick structure close to the beach, 2 miles eastward of Nipa point.

Mantalinga islet is a small, round, wooded islet about half a cable in diameter and 75 feet high, lying $1\frac{3}{4}$ miles eastward of Nipa point. The channel between the islet and the coast is half a mile wide and 20 feet deep, but the islet is too small to afford protected anchorage.

Olutaya island, about $1\frac{1}{2}$ miles northward of Pirara point, is one mile in length, north-east and south-west, 372 feet high, and very narrow. Two rocks above water lie off its north-east part, and another off its south-west end. The coast of the island forms little bays, in which coasters find anchorage in a depth of 3 to 4 fathoms. There are from 7 to 17 fathoms around it. The passage between it and Nagtig islet is about three-quarters of a mile wide, and appears to be clear, with a depth of 9 fathoms.

Nagtig islet, north-westward of Pirara point, lies close to the coast of Panay. The north side of the islet is steep-to, but the channel between it and Panay is foul.

Coast.—From Pirara point the coast trends south-east, and then north-east to Bulakau point, forming Pilar bay, 19 miles wide and 9 miles deep, the southern part of which is filled up with a bank, extending over 4 miles from the shore. The depths in the bay are from 2 to 5 fathoms.

Tinagondaget inlet, in the western part of the bay, is entered by small steamers; it has depths of from 2 to 8 fathoms.

Tukat reef, 3 miles north-west of the town of Casanayan, on the south-eastern shore of Pilar bay, is three-quarters of a mile long, east and west, and half a mile wide; it consists of sand and rock, and the middle part uncovers at very low tides, there being less than 6 feet over the remainder. From the centre of the bank, Mount Agudo, 2,736 feet in height, bears S. $\frac{1}{2}$ W., and Olutaya island W.N.W.

Bulakau point (*Lat. $11^{\circ} 37' N.$, Long. $123^{\circ} 9' E.$*), the north-east extremity of Panay island, is a spur from Mount Sibala, which has an elevation of 1,858 feet; the point is low, and terminates in a

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ}10'E$. sandspit with rocks at the end, which extend out for a distance of 3 cables and uncover at low water.

Tidal streams.—In the waters north of Panay, sometimes called the sea of Kapiz, the flood stream enters from the westward by the passages between Panay, Karabao, and Tablas, and also by the passages between Tablas, Romblon, and Sibuyan.

This last stream passes along the south-west coast of Sibuyan and between Kaut point and Cresta de Gallo, with great strength, but on the east coast of Sibuyan it meets the flood stream from the eastward by the strait of San Bernardino, and loses all its force.

The ebb stream moves in the reverse direction, and by the same passages, and is not felt on the south-west coast of Sibuyan.

The stream, at full and change, runs at the rate of $3\frac{1}{2}$ miles an hour between Panay and Tablas, and at 2 miles an hour between Tablas and Sibuyan.

HINTOTOLO CHANNEL, or Pass, is the name given to the passage between the south-west point of Masbate and the north-east point of Panay. Hintotolo island, already described (*see* page 347), and the Zapatos, three islets on a bank $4\frac{1}{2}$ miles in length north-east and south-west, lying $6\frac{1}{2}$ miles south-west of Hintotolo island, divide the channel into three passages; that between Hintotolo island and the Zapatos is generally used.

Zapato Mayor (*Lat. $11^{\circ}46'N.$, Long. $123^{\circ}1'E.$*) is 187 feet high, wooded, and cultivated; a shoal extends three-quarters of a mile south-westward from the island, which has a sunken rock near the outer end.

Zapato Menor is 171 feet high, bare, and clean on all sides except the western, from which there projects a narrow ledge.

The little islet, Chinela, between the two Zapatos, is 47 feet high, and fringed by reef for a distance of from 3 to 4 cables. The depth of water on the bank and between the islets is $5\frac{1}{2}$ to 8 fathoms.

Cucaracha shoal is a bank about $3\frac{1}{4}$ miles in length, east and west, with a least depth of $1\frac{1}{2}$ fathoms on its west end, from which Zapato Mayor bears N. $63^{\circ}W.$, distant $9\frac{1}{2}$ miles. Over the remainder of the bank the depth is 3 fathoms.

ISLANDS OFF THE EAST COAST OF PANAY.—

Manigonigo, $1\frac{1}{2}$ miles E. by N. $\frac{1}{2}$ N. of Bulakau point, is a conical islet, small and sandy, 90 feet high, surrounded by rocks to the distance of one cable on all sides but the south, in which direction foul ground extends to 2 cables. *See* view *b*, at page 352. The channel between the islet and the point has a depth of $2\frac{1}{2}$ fathoms, and is only fit for small craft; a dangerous rock, covered by $1\frac{3}{4}$ fathoms water, lies

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E.
one mile S.S.W. $\frac{1}{4}$ W. of Manigonigo, and less than $1\frac{1}{2}$ miles from the Panay coast.

LIGHT (*Lat. 11° 37' N., Long. 123° 10' E.*).—From an iron cylindrical white tower, 29 feet in height, on Manigonigo islet, at an elevation of 68 feet above high water, is exhibited a *white flashing light every five seconds*, visible 14 miles in clear weather.

The keepers' dwellings, adjoining the lighthouse, are of red brick with grey facings and roof.

Tidal streams.—The tidal streams are strong off the north-east point of Panay; the flood stream sets to the east, and the ebb to the west.

Nabunut, 3 miles E. by S. of Bulakau point, is an islet one mile in extent and 100 feet high; it is surrounded by rocks which extend 4 cables from the islet south-westward. A patch of 2 fathoms lies at the distance of $1\frac{1}{2}$ miles north-east of the islet, and another of 3 fathoms lies a short distance south-eastward of the 2 fathoms.

Tulunanaun, $1\frac{3}{4}$ miles south-east of Nabunut, is $1\frac{1}{2}$ miles long, and has a hill 200 feet high on its northern part; it is encircled by rocks to the distance of 2 cables. The channel which separates it from Nabunut has a depth of 3 fathoms. A pinnacle rock, of small extent, with a depth of 2 fathoms on it, lies about $1\frac{1}{2}$ miles S. 9° E. from the eastern extreme of Tulunanaun.

Balbagan is about a mile long north and south, narrow, covered with trees about 100 feet in height, and has a little sandhill at the southern end; it is surrounded by rocks, and by a shoal which extends from it three-quarters of a mile to the north, east, and south; there is a small sandy cay nearly half a mile southward of the south end, and three-quarters of a mile southward of it the chart shows a bank, near which the depth is 3 fathoms; the west coast is clear at the distance of 2 cables. At $1\frac{1}{4}$ miles E. by S. $\frac{1}{2}$ S. of the south end of Balbagan, between it and South Gigante, there are rocks awash at low water, surrounded by a sandbank, and three-quarters of a mile east of the island is an islet. The depths in the channel between Balbagan and South Gigante are from 16 to 21 fathoms, with 6 fathoms in the middle of the northern entrance, westward of North Gigante island. The channel between Balbagan and Tulunanaun is about three-quarters of a mile wide at the northern end, between Balbagan and the shoals east-north-eastward of Nabunut, and has a depth of 18 fathoms. The depths on the western side of this channel are irregular. Vessels of large draught, however, will do well to take the passage north of

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ}10'E$. the Gigantes, rather than that between Balbagan and Tulunanaun islets.

GIGANTES ISLANDS are a group of two islands of moderate height, together with several islets, and some sharp-pointed detached rocks. The group is clear on its northern side, and the shoals on the other sides do not project more than three-quarters of a mile.

North Gigante is 2 miles long north and south, and one mile wide, with a wooded hill on either extremity; it is surrounded by a shoal which extends half a mile to the east and west. At 7 cables east of the north-east extremity lies Uaidajon islet, clear and steep, with a depth of $3\frac{1}{2}$ to 9 fathoms between it and North Gigante; on the south-east edge of the bank there are three detached rocks, with no channel between them and the island.

LIGHT (*Lat. $11^{\circ}39' N.$, Long. $123^{\circ}21' E.$*).—On the north-east point of North Gigante island a *white and red alternating group-flashing* light, showing three *white* flashes followed by a *red* flash every fifteen seconds, visible 14 miles in clear weather, is exhibited, at an elevation of 78 feet above high water, from a white cylindrical tower, 38 feet high; the detached dwelling at its base is painted white, with a grey roof. For arc of visibility, *see* Light list and chart. *See* view *d*, at page 352.

South Gigante, half a mile south of the northern island, is of irregular form, and about 2 miles in length from east to west and $1\frac{1}{2}$ miles wide in the western part, which is the highest. On its northern side is a rocky reef, which forms, with the reef of the northern island, a shallow channel, with a depth of $1\frac{1}{2}$ fathoms: the other sides are clear, except for a sunken rock near the western point. At 8 cables south-east of South Gigante are three small islets lying on the north and west sides of a shallow bank, which extends more than a mile southward from Antonia, the north-eastern islet. Between these islets and South Gigante there is a channel in which the depth is $5\frac{1}{2}$ to 8 fathoms.

Anchorage.—In the north-east monsoon vessels of all sizes can anchor off the south-west coast of South Gigante in a depth of 7 fathoms, mud and sand. In the south-west monsoon very small vessels can anchor in the channel between the islands.

Bank.—About 10 miles N.E. by E. $\frac{3}{4}$ E. from the north-east point of North Gigante is the shallowest part ($3\frac{1}{4}$ fathoms) of a bank of irregular shape, which extends approximately 11 miles east-south-east and west-north-west, with a mean width of $3\frac{1}{2}$ miles. The depth on it is irregular, from $3\frac{1}{4}$ to 10 fathoms. On the south-western part of the bank, a depth of 4 fathoms lies N. 67° E., about $5\frac{1}{2}$ miles from the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.
 North Gigante lighthouse. The bank lies between the bearings N. by E. $\frac{3}{4}$ E. and East, from the north-east point of North Gigante. The channel between the shallow part of the bank and North Gigante is the most open and direct for vessels proceeding to or from the Hinto-tolo channel, but there is a shoal of 4 fathoms close to the pecked lines showing the route on the chart.

Isolated shoals.—Within a radius of 16 miles from N.W. $\frac{3}{4}$ W., through north and east, to S.E. $\frac{1}{2}$ E. of North Gigante lighthouse there are a certain number of isolated patches, covered by $4\frac{1}{4}$ to 7 fathoms water. Some of these, with the bearing and distance from North Gigante lighthouse, are as follows:—4 fathoms, N. 25° W., $4\frac{1}{4}$ miles; $4\frac{3}{4}$ fathoms, N. 5° E., $5\frac{1}{2}$ miles; $4\frac{1}{4}$ fathoms, N. 23° E., 15 miles; $3\frac{1}{2}$ fathoms, N. 44° E., $11\frac{1}{2}$ miles; $3\frac{1}{2}$ fathoms, N. 52° E., $13\frac{1}{2}$ miles; 4 fathoms, N. 63° E., $13\frac{1}{2}$ miles; 5 fathoms, S. 82° E., $15\frac{1}{2}$ miles; and $3\frac{1}{2}$ fathoms, S. 63° E., $6\frac{1}{2}$ miles. For the others, the chart should be referred to.

Coast.—From Bulakau point, the coast trends south-south-east for $2\frac{1}{2}$ miles to a bluff, Blanca point, and thence forms a wide but shallow bay, fronted by Balin island, and terminated by Gogo point, $4\frac{1}{2}$ miles south of the bluff. This bay, which is named Bankul, has only a depth of $1\frac{1}{2}$ fathoms at high water, and at low water several sandbanks appear which block the passage to the three rivers that fall into it.

Balin (Binuluangan) island is $3\frac{1}{2}$ miles long, low and of irregular shape; it has a surrounding reef, upon which are several rocky islets.

Kalaguan island (*Lat. 11° 30' N., Long. 123° 12' E.*) is separated from Balin by a channel 7 cables wide at the north-east end, but almost closed to the south-west; it is $3\frac{1}{2}$ miles long north-east and south-west, 3 miles wide, and 1,112 feet high. The east coast is clear and steep. Anchorage may be had south of Kalaguan in a depth of 7 fathoms.

Cañas is a small islet off the east coast of Kalaguan, half a mile long, east and west, of middling height; a coral reef of $1\frac{3}{4}$ fathoms extends about $1\frac{1}{4}$ miles north-eastward from the east end of Cañas; a rock with about one foot of water on it lies $3\frac{1}{4}$ cables N. 40° E. from the same point. In the channel between it and Kalaguan the depth is 7 to 11 fathoms, and between it and Sikogon to the southward the depth is 11 fathoms, with, however, a patch of $1\frac{1}{2}$ fathoms one mile from the Sikogon shore.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E.

Sikogon, 6 cables south-east of Kalaguan, is 1,142 feet high and $2\frac{1}{2}$ miles in length north and south. The north-east part has a reef 2 cables in width, on which there is a little islet, steep on the outside; this reef fringes the island on its northern and western sides, but the south-east coast is clean and steep-to.

At 2 miles east of the little islet on the north-east side is a patch of 4 fathoms, and another of $4\frac{1}{2}$ fathoms about $2\frac{1}{2}$ miles further, with deep water around.

Sikogon channel, between Sikogon and Kalaguan, is half a mile wide, and carries a depth of 8 fathoms; it is clear and safe, and is the channel recommended for vessels making for Iloilo strait.

Coast.—South of Gogo point is the sheltered anchorage of Estancia, with a depth of 4 fathoms between the little isle of Luginut (south-west of Kalaguan) and the Bayas isles. The town of Estancia is a mile inland, and there is a good road to it from the coast. From Estancia anchorage southward the coast is foul, and should be avoided till off Magalumbi island, which is high, and bold on the eastern side; it then forms two bays, which afford fair shelter and anchorage in westerly winds.

Bayas isles are a group of four islets of little height, near the coast, 3 to 4 miles south-south-eastward of Gogo point. They extend $1\frac{3}{4}$ miles from east to west, and are surrounded by sandbanks and rocks, with no passages between them. At one mile west of the south point of the largest isle there is a rock awash at low water, and between Bayas and the island to the northward, Luginut, there is another patch covered by half a fathom.

Culebra (*Lat. 11° 22' N., Long. 123° 13' E.*).—Midway between Sikogon and Pan de Azucar island is the small island Culebra, about 200 feet high, with a ledge of sand and rock extending 6 cables westward from it, with $1\frac{1}{2}$ fathoms at its extreme western edge; there is a depth of 11 fathoms at a short distance from the island and from the reef.

Shoals.—There are three shoals northward and eastward of Culebra. The northernmost, $2\frac{1}{2}$ miles N.E. $\frac{1}{4}$ N. of Culebra, is one mile in extent, with a least depth of $2\frac{3}{4}$ fathoms; the easternmost lies 4 miles E.N.E. of Culebra, and has a depth of $2\frac{1}{2}$ fathoms; and the southernmost shoal is situated $2\frac{1}{2}$ miles E. $\frac{1}{2}$ N. of Culebra, with 3 fathoms least water. These three shoals have depths of 8 to 20 fathoms around them, which is the general depth off the N.E. coast of Panay.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E.

From $4\frac{1}{2}$ to $6\frac{1}{2}$ miles south-east of Culebra, and from 5 to $6\frac{1}{2}$ miles eastward of Pan de Azucar, there is a group of three shoals, upon which the depths are from $2\frac{1}{2}$ to 3 fathoms; they are surrounded by depths of 14 to 18 fathoms.

Pan de Azucar (sugar loaf) is the largest of a group of five islands near the coast of Panay at the northern entrance of Iloilo strait. It is nearly 4 miles long north and south, with a greatest breadth of $2\frac{1}{2}$ miles, and has two remarkable peaks, the highest of which is elevated 1,881 feet. The north coast sends out a reef to the northward, which terminates in a rock at the distance of half a mile from the island. The east coast is clear. Between this island and Tago, to the south-west, there is a narrow channel in which the depth is from one to $1\frac{1}{2}$ fathoms.

Bagaisi, one mile north of Pan de Azucar, is steep-to; at about $1\frac{1}{4}$ miles E. $\frac{1}{2}$ N. from it is a shoal of $4\frac{1}{4}$ fathoms. Naburut, on the north-west side of Pan de Azucar, lies on the shore bank extending from that island.

Midway between Pan de Azucar and the coast of Panay there is a small shoal, one cable in extent, and awash at low water; between the shoal and Pan de Azucar the depth is $4\frac{1}{2}$ fathoms.

Sombrero (*Lat. 11° 16' N., Long. 123° 10' E.*), on the south-east coast of Pan de Azucar, is clear and steep-to on the east side, but is connected with Pan de Azucar by a narrow sandbank; it is about 500 feet high.

Malangaban, 2 miles south-east of Pan de Azucar, and nearly round in shape, is high, clear, and deep off its western part; the little islet close to its south-west part is also clear. The channel between Malangaban and Pan de Azucar carries a depth of 9 to 11 fathoms.

Agio, an islet lying between Malangaban and Igbon, is small, and has a narrow fringing reef; the channel between it and Igbon has a depth of 3 to 4 fathoms.

Tago island, between Pan de Azucar and the headland of Baka-han, is $3\frac{1}{2}$ miles in length, north and south, and of moderate height. On the eastern side the passage between Tago and Pan de Azucar is shoal, and a rock awash at low water is situated about half a mile off the south-east point of the island; between this shoal and Igbon the depth is 8 fathoms. The western shore and the south point send out reefs, and off its south-west part is a rocky shoal, awash at low water. The passages which these reefs and shoal form with the coast of Panay have a depth of $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms.

Botlog, half a mile N.W. of the north-west point of Igbon, is

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ}10'E$. round, high, and steep-to. At its south-east part there is anchorage in 9 fathoms, mud, sheltered from south-west winds. The channel between it and Igbon is clear, with a depth of $6\frac{1}{2}$ fathoms.

Bagabu is a small wooded islet lying near the south point of Tago from the south end of which a point of sand and rocks projects a short distance. On the west side a sandspit nearly dry at low water stretches across to the mainland of Panay. The channel between this islet and Igbon is $1\frac{1}{2}$ miles in width and carries a depth of 7 fathoms.

Vessels desirous of communicating with Concepcion, a small town in Panay abreast the south end of Tago island, should anchor in 5 fathoms with Bagabu in line with the south end of Tago. Inshore of this position the water shoals rapidly. The town is not visible from the anchorage.

Igbon, 2 miles S.S.E. of the south point of Pan de Azucar, is triangular in shape, of moderate height, clear, and steep-to; off its south point are two islets joined to the point by a reef.

Baliguian (*Lat. $11^{\circ} 13' N.$, Long. $123^{\circ} 20' E.$*), $8\frac{1}{2}$ miles East of Igbon, is a small islet, 87 feet high, surrounded by a narrow reef, falling abruptly into depths of 15 to 20 fathoms. This islet is a good natural mark for vessels making Iloilo strait from the northward and from the eastward, and is useful for clearing the numerous shoals about the route.

Shoals.—The three shoals nearest to the track recommended are—one of $3\frac{1}{2}$ fathoms lying N.E. by N. $4\frac{1}{2}$ miles from Baliguian; another of $2\frac{1}{2}$ fathoms situated N.E. by E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles from it; and the third of $2\frac{3}{4}$ fathoms lying S. $\frac{1}{2}$ E. $2\frac{1}{4}$ miles from the same island.

A written description of the many other shoals which encumber the channel north of Negros island, between the N.E. part of Panay and the island Bantayan, would be needless; they can best be understood from the chart.

Chart 2578, E. part of Sulu or Mindoro sea.

Tagubanhon island, 4 miles in length north-east and south-west, and 2 miles wide, lies a little more than a mile south-eastward of Bakahan bluff, on the coast of Panay, with which it forms the pass named Apiton. The island is high, clear, and steep-to.

Apiton pass is the southern termination of the inner route to Iloilo strait from the northward; a shoal with a depth of $3\frac{1}{2}$ fathoms over it lies in mid-channel of the northern entrance at about one mile eastward of Bakahan bluff; otherwise the pass is clear with a depth of 9 to 17 fathoms, and the coasts on either side are steep.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Shoal.—A rocky shoal on which the depth is $3\frac{1}{2}$ fathoms lies nearly one mile south-south-west of the south point of Tagubanhon island, with Anauayan island bearing E. by N., distant about $2\frac{3}{4}$ miles.

Anauayan (*Lat. 11° 5' N., Long. 123° 9' E.*) is a small island 336 feet in height, lying 2 miles eastward from the south end of Tagubanhon.

Ilakaon channel.—A shoal of sand and coral, with scattered boulders, about $2\frac{1}{2}$ cables in extent, and with a least depth of $1\frac{1}{4}$ fathoms, lies in the channel between Ilakaon and Anauayan islands, with the highest part of Anauayan island bearing N. 63° W., distant $2\frac{1}{4}$ miles. The channel elsewhere is clear, with depths of from $4\frac{1}{2}$ to 10 fathoms.

The channel between Tagubanhon and Anauayan is clear, with depths of from 10 to 20 fathoms.

Turia rock, of small extent, with $2\frac{1}{2}$ feet water on it and a depth of 8 fathoms close around, is situated 4 miles south-west from Anauayan, and forms a serious danger in the route to Iloilo strait. From the rock, Calabazas lighthouse bears N. 70° W., distant $5\frac{1}{4}$ miles.

Buoy.—Turia rock is marked by a red and black horizontally striped can buoy, moored in $4\frac{1}{2}$ fathoms north-westward of the rock. Vessels should pass westward of the buoy, giving it a berth of half a mile.

There is a small rock covered by $2\frac{1}{2}$ fathoms lying a quarter of a mile north-eastward of Turia rock; and at $1\frac{1}{4}$ miles north-eastward of Turia rock is a shoal on which the least water found was 5 fathoms, but the charted depth is 6 fathoms.

Anchorage.—The *Challenger* in October, 1874, anchored for the night north of Anauayan in a depth of 10 fathoms, with the right tangent of Tagubanhon bearing North, and the left tangent S. 53° W. There is also anchorage off the north-west side of Tagubanhon, and off Bakahan bluff.

S.E. COAST OF PANAY.—The north side of Apiton pass is formed by a rocky headland, Bakahan bluff, high, clear, and steep-to, with a little islet joined to its south-west part. On the south side of the bluff is Apiton cove, a creek with an entrance channel one fathom deep, close to the north shore; inside there is a depth of 3 fathoms, and anchorage for small craft near some rocks off the beach.

Water.—There is a watering place on the north shore near the first beach at the entrance; water can also be obtained on the south side, but here it is not so good.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

West of Apiton cove the coast forms a bay, Ahui, $3\frac{1}{2}$ miles wide, in which there is shelter from north-east winds. The River Ahui, leading to the town of the same name, enters on the north shore; it has a depth of one to $1\frac{1}{2}$ fathoms at high water.

Binanan islets are two small islets in the middle of Ahui bay; between them and about them to the eastward and southward the depth is $4\frac{1}{2}$ fathoms.

On the western shore of Ahui bay are the towns Bato and Pili, the latter standing on a little height on the western point of the bay. Sal islets, nearly three-quarters of a mile apart north and south, lie about a mile from the shore south-eastward of Pili.

Calabazas islets are two small islets, situated about 6 miles west-south-westward of the south point of Tagubanhon, and nearly a mile from the coast of Panay; there is anchorage northward of the westernmost islet in a depth of $5\frac{1}{2}$ to 7 fathoms, sheltered from south-west winds. The depths outside the islets are from $4\frac{1}{2}$ to 8 fathoms, and between them $3\frac{1}{2}$ fathoms. Vessels can pass between them and the coast in $5\frac{1}{2}$ to 7 fathoms.

LIGHT (Lat. $11^{\circ} 4' N.$, Long. $123^{\circ} 0' E.$).—A white group flashing light with a red sector, showing groups of three flashes every fifteen seconds, visible, white light 16 miles, red light 4 miles, in clear weather, is exhibited, at an elevation of 100 feet above high water, from a white and grey cylindrical iron tower, 39 feet high, with quadrangular base, situated about 220 yards from the south extreme of the eastern Calabazas islet. At the base is the keeper's dwelling, white with red roof. For sector and arc of visibility, see Light list. See view *c*, at page 352.

Pepitas rocks, situated 2 miles to the south-westward of Calabazas light, are some black rocks, 7 feet high, about one cable in extent; vessels can pass between them and the coast, and also between the rocks and the Calabazas, but the main channel lies eastward of them. The rocks are covered by a sector of red light from Calabazas islet between N. 27° E. and N. 40° E.

Coast.—Kulasi bay and Cañas bay offer no shelter. Barotak bay has a depth of from 2 to 4 fathoms; a river of the same name enters it, in which boats can ascend at high water to the town of Barotak. The point which separates this bay from the next to the southward, Banate, is surrounded by rocks, steep-to, which continue round the shore to the town, Banate. A rock that dries 2 feet lies about two-thirds of a mile southward of the point. From here the coast trends to the southward for about 13 miles to Dumangas point, and then west 4 miles to Talagios river; it is low and covered by mangroves,

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

and is unapproachable on account of shoal water, there being a depth of $1\frac{1}{2}$ fathoms at a distance of $2\frac{1}{2}$ miles from the shore northward of Dumangas point in places. The Tinorian and Talagios rivers are shallow, and boats can only enter them at high water.

Buoys.—The shoal water north-eastward and eastward of Duman-gas point is marked by two buoys placed as follows:—

A red conical buoy, marked No. 2, is moored in a depth of 5 fathoms about 6 miles N. 59° E. from Dumangas point. A red conical buoy, marked No. 4, is moored in 4 fathoms of water $5\frac{8}{10}$ miles N. 84° E. from Siete Pecados lighthouse.

Mounts Orok and Saligit are about 2 miles apart in a north and south direction; Orok has a small sharp peak, 407 feet high, and Saligit a long flat summit 487 feet in height. When in line they serve as marks for the eastern end of Iguana shoal. Kolau hill is low, and not conspicuous until bearing west.

Tomonton shoal (*Lat. $10^{\circ} 55'$ N., Long. $122^{\circ} 56'$ E.*), off Tomonton point in Negros, stretches nearly 3 miles to the north-west from that point, and must be given a wide berth; it has a depth of from one to $1\frac{1}{2}$ fathoms on it, and is said to be extending.

Buoy.—A black can buoy is moored in a depth of $4\frac{1}{2}$ fathoms to mark the edge of the shoal extending north-westward of Tomonton point. There is a $2\frac{1}{4}$ -fathoms patch immediately inshore of the buoy.

Chart 2391, Iloilo strait.

Iguana bank is a shoal of sand about $2\frac{3}{4}$ miles in length east-south-east and west-north-west, within the 3-fathoms limit, and 9 cables wide in the centre, tapering north-eastward and north-westward; it lies between Dumangas point and Guimaras island near the middle of the north-eastern approach to Iloilo strait, leaving channels on either side. The eastern extreme of the bank is nearly 5 miles from Siete Pecados light, and the position of the least depth, three-quarters of a fathom, is S. 65° E. $3\frac{1}{4}$ miles from the light.

The part of the bank covered with less than 3 fathoms water lies approximately between the bearings of S. 56° E. and S. 81° E. from Siete Pecados lighthouse, the light from which shows a *red* sector over the greater part of the bank; the northern limit of this sector does not clear the bank, but falls over the edge of it in a depth of $2\frac{3}{4}$ fathoms, which must be remembered in passing.*

Buoys.—Iguana bank is marked on its north-eastern and north-western edges by black can buoys, Nos. 1 and 3 respectively, and on its southern side by a red conical buoy, No. 6.

* It is intended to alter the sector of *red* light shown from Siete Pecados to cover the whole of Iguana bank.

Chart 2391, Iloilo strait. Var. 1° 10' E.

The channel northward of the shoal between the 3-fathoms curves is $1\frac{1}{4}$ miles wide with a least depth of $3\frac{1}{4}$ fathoms; and the channel southward between the same limits is one mile wide with a least depth of $3\frac{1}{4}$ fathoms in its southern approach, on a bank extending from Guimaras island; but between that bank and Iguana bank there is a channel one mile wide with a least depth of $6\frac{1}{4}$ fathoms. The tidal streams set with great force over Iguana bank.

Siete Pecados (*Lat. 10° 46' N., Long. 122° 40' E.*) is a cluster of rocky islets covered with small trees and bushes lying in mid-channel westward of Iguana bank, between Panay and the north end of Guimaras. The highest, from which a light is exhibited, is steep, as are also the other rocks; but on the ends of the shelf on which they stand, about half a mile in extent, north-east and south-west, there are rocks with very little water on them. A sunken rock with less than 6 feet water over it lies about 2 cables northward from the lighthouse, with a patch of $1\frac{1}{2}$ fathoms close eastward of it, and deep water a short distance northward of them. A rock with a least depth of 2 feet on it at low water lies 3 cables south-west of the lighthouse, with deep water close-to. *See view f, at page 352.*

The channel between the Siete Pecados and the coast of Panay is half a mile wide, and 10 to 19 fathoms deep; the passage between these islets and Guimaras is of the same width, with a depth of $4\frac{1}{4}$ to 16 fathoms, but about a mile south-south-eastward of the lighthouse, and in mid-channel, is an extensive patch on which the least depth is 3 fathoms at low water. The northern channel is preferable.

From the Siete Pecados to the port of Iloilo the channel is clear.

LIGHT.—From a lantern projecting from a white dwelling, 29 feet high, on the largest islet of the Siete Pecados group, at an elevation of 85 feet above high water, is exhibited a *white flashing* light with a *red* sector, showing *one flash every second*, visible 15 miles in clear weather. For sector, *see* Light list and charts.

Tidal streams.—The flood stream in Iloilo strait sets to the north as far as Pan de Azucar, approximately, when it meets the other branch of the flood stream coming from the northward. The ebb stream runs in the opposite direction, *i.e.*, to the southward in Iloilo strait, and to the northward north of Pan de Azucar. The tidal streams in the strait attain a rate of 3 to 4 miles an hour.

Charts 2577, 2578. Var. 1° E.

GENERAL DIRECTIONS from Verde island passage to Iloilo.—Eastern route.—The directions for Verde island passage as far as Dumali point have been given in the last chapter (*see* page 312). From a position 3 miles north-east of Dumali

General charts 2578, 943, 1263.

Charts 2577, 2578. Var. 1° 10' E.

point a S.E. $\frac{1}{4}$ E. course will lead between Dos Hermanas and Maestre de Campo islands and west of Simara; then Cobrador island should be steered for until the channel opens between Romblon and Tablas islands. After rounding the north-east point of Tablas a South course takes a ship in mid-channel and clear of all danger. By night this South course should be kept for 15 miles, or until the south tangent of Romblon island bears N. 62° E., then a S. 55° E. course leads 2 miles south-westward of the southern end of Cresta de Gallo reef and between Hintotolo island and Zapato Mayor; this track passes close northward of Elcano bank, which it is as well not to cross.

From a position 2 miles south of Hintotolo island (*Lat. $11^{\circ} 51' N.$, Long. $123^{\circ} 7' E.$*) a course S.E. by E. $\frac{1}{2}$ E. should be steered for 11 miles until the peak of Pan de Azucar bears S. by W. $\frac{1}{4}$ W., or until the hill on the east end of Cañas island is in line with the highest hill of Sikogon island, bearing S. 2° W., and then steer S. 2° W. with the latter marks on. This will lead between Balbagan and Tulunanaun islets and eastward of the 3-fathoms patch between Balbagan and Nabunut islets.

Pass westward of Cañas island, giving a berth of half a mile, and steer for the middle of the channel between Kalaguan and Sikogon. This channel being passed, steer S. by W. $\frac{1}{2}$ W. to pass $1\frac{1}{2}$ miles westward of Culebra island; and when west of that island steer to pass between Sombrero on the south-east coast of Pan de Azucar and Malangaban, avoiding the $4\frac{1}{4}$ -fathoms patch eastward of Bagaisi. Then proceed between Igbon and Botlog, which is half a mile north-west of it, avoiding the rock awash south-eastward of Tago island; continue on through Apiton pass, in the northern entrance of which there is a depth of $3\frac{1}{4}$ fathoms, between the coast bluff and Tagubanhan, and enter the strait of Iloilo. After leaving Apiton channel the Calabazas islands and Pepitas rocks will be passed at the distance of one to 2 miles.

Vessels drawing less than 13 feet can pass between Bulakau point and Manigonigo islet, but this channel is not recommended.

If it is proposed to proceed outside the islands, after passing between Balbagan and Nabunut, when abreast of the north end of Tulunanaun steer S.S.E., avoiding the reef eastward of Cañas island, until Baliguian islet bears South; a course for that islet will then lead midway between the $2\frac{1}{2}$ -fathoms and $3\frac{1}{2}$ -fathoms patches described at pages 361 and 362. Pass westward of Baliguian, when a course S.W. $\frac{3}{4}$ W. will lead between Anauayan and the $1\frac{3}{4}$ -fathoms shoal 2 miles south-eastward of it; be careful to avoid Turia rock. To clear this danger Calabazas light should be steered for as soon as it

General charts 943, 1263.

Charts 2577, 2578. Var. 1° 10' E.

bears S. 89° W., and when distant 3 miles from it alter course to S.W. $\frac{1}{2}$ W. The shoal of $3\frac{1}{2}$ fathoms southward of Tagubanhon must be avoided.

If it is preferred to pass northward and eastward of the Gigantes, North Gigante should be passed at the distance of $1\frac{1}{2}$ miles, and either the Sikogon and Apiton passage may be taken, or the Anauayan channel.

From Apiton pass (*Lat. 11° 9' N., Long. 123° 7' E.*) or Anauayan channel, whichever has been taken, a course should be steered to pass at least $3\frac{1}{2}$ miles from Tomonton point in Negros, passing outside the black buoy marking the reef, and then a S. 19° W. course should be preserved for a distance of 12 miles, keeping a look-out for the reefs off the coast of Panay, the eastern limit of which is marked by a red conical buoy N. 59° E. 6 miles from Dumangas point. When Siete Pecados lighthouse bears W. $\frac{1}{2}$ N., it should be steered for; this will lead clear of the shoal water off Dumangas point, marked by a red conical buoy, and that of the Iguana bank, marked by two black can buoys.

Chart 2391, Iloilo strait.

Directions for Iloilo strait.—Coming from the eastward and passing north of Siete Pecados vessels should approach the light on those islets on a W. $\frac{1}{2}$ N. bearing, avoiding the *red* sector (*see* page 365). From abreast the lighthouse a mid-channel course should be maintained to Kabugao point, when the lighthouse or light at Iloilo may be steered for; pass about 4 cables off Dapdap point, and thence to the anchorage off Iloilo river. *See* page 334.

To pass southward of Siete Pecados, the lighthouse or light should be approached bearing about N.W. $\frac{1}{4}$ W., avoiding the *red* sector and the bank extending about one mile north-eastward of Nabalas village. This leads over a least depth of $3\frac{3}{4}$ fathoms. When the north point of Guimaras bears W. $\frac{1}{2}$ S., alter course to W. by N., which will lead southward of Siete Pecados in not less than $4\frac{1}{4}$ fathoms. When westward of the light proceed as directed before, but particular care must be taken when rounding the south-west end of Siete Pecados shelf, where there is a sunken rock at the distance of 3 cables from the lighthouse.

Northward from Port Iloilo.—Leaving Iloilo by the eastern channel, pass northward of the Siete Pecados rocks and bring them to bear W. $\frac{1}{2}$ N. astern, which will lead between Iguana bank and the shoal water off the northern shore; and when abreast the red buoy off Dumangas point the course may be shaped north-eastward.

General charts 2578, 943, 1263.

CHAPTER VII.

NEGROS, SEBU, BOHOL ISLANDS, AND PART OF LEITE ISLAND;
SURIGAO STRAIT, AND THE NORTH AND WEST COASTS OF
MINDANAO.

VARIATION IN 1911.
Increasing about 1' annually.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

NEGROS ISLAND.—So called from the number of Negrotis or Aetas found on it by the Spaniards, is about 118 miles long in a north and south direction, and varies in breadth from 21 to 49 miles. It is the fourth island in size of the Philippines, having an area of 4,881 square statute miles, but though so much larger than Sebu island, is neither so rich nor so populous. It is divided into two provinces, Occidental and Oriental Negros. Its coast is very little broken by bays or inlets, and does not contain any good harbour. A central chain of mountains runs through it from north to south, which attains a height in Kanlaon volcano of 7,992 feet. The rivers are but small, and unfit for the navigation of vessels of burthen.

The island produces the best cacao in the Visayas, besides rice, maize, sugar, tobacco, cotton, and hemp. The population in 1899 was estimated by the Philippine Commission to be about 392,000, chiefly Bisayans.

Telegraph cables.—Negros is connected at its southern end by submarine cable with Mindanao, and at its north-west end with Iloilo in Panay, and is thus united to the general telegraphic system.

NORTH and NORTH-WEST COASTS of NEGROS.
—**Bito point** (*Lat. 10° 57' N., Long. 123° 30' E.*), also named Sagay point, the north-east extremity of the island, is of no great height, rocky, and fringed to the distance of three-quarters of a mile by a shoal which dries in places at low water.

Panalsagon point, about 2 miles northward of Bito point, is separated from it by a shallow inlet full of mangroves. It is surrounded by a reef which extends half a mile northward and 1½ miles eastward from it.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Molokabok island, $2\frac{1}{2}$ miles east-north-east of Panalsagon point, is $1\frac{1}{4}$ miles in extent, and lies, along with several islets and rocks westward of it, on a shoal $4\frac{1}{2}$ miles in length west-north-west and east-south-east, and $1\frac{3}{4}$ miles in width. The channel between the island and the reef extending from Panalsagon point is about one mile wide, with depths of from $6\frac{1}{2}$ to 14 fathoms. In the channel northward of Molokabok island, the flood stream sets westward, and the ebb eastward.

Shoal.—A shoal with a depth of $1\frac{3}{4}$ fathoms over it is situated 4 miles east-north-eastward of Molokabok island.

Caution.—The channel between the Don islands and Molokabok island should be navigated with great care.

Coast.—From Panalsagon point to the northern extreme of the island, 19 miles west-north-westward, the shore is foul and rocky, and is fronted by a shoal bank which extends from 2 cables to $2\frac{1}{2}$ miles off.

Suyak islet (*Lat. 10° 57' N., Long. 123° 27' E.*), a small, densely-wooded, conspicuous islet, lies $3\frac{1}{2}$ miles north-westward of Panalsagon point, on the edge of the shore reef.

Shoals.—Carbin reef, on which there is a sand cay reported to be increasing in size, lies about $1\frac{1}{2}$ miles north-north-eastward of Suyak islet. The cay is about half as large as Suyak, and is a useful mark for vessels rounding the northern part of Negros.

Three reefs lie in a N.N.E. direction from the town of Himugaan on the west side of entrance of the river of that name, situated about 8 miles westward of Bito point. Panal reef, the southern of the three, lies $3\frac{1}{2}$ miles from the shore, with a depth of 9 fathoms inside it, is more than a mile long, and dries over the western, but has 2 fathoms on the eastern, half. Maca reef, which dries, lies 7 miles from the shore, is 2 miles long north-west and south-east, and $1\frac{1}{4}$ miles wide; the channel between it and Panal reef is 2 miles wide, and clear, with a depth of 12 fathoms. The northern reef, lying 9 miles from the shore, is $1\frac{3}{4}$ miles long north-west and south-east; it has less than 6 feet on its south-eastern, and $2\frac{3}{4}$ fathoms on the north-western part; it is separated from Maca reef by a deep channel about half a mile wide.

A shoal with 3 fathoms least water lies 2 miles north-eastward, and one of $4\frac{1}{4}$ fathoms $3\frac{3}{4}$ miles eastward, of Maca reef.

Carmen shoal, lying 5 miles N.N.E. from the town of Cadiz Nuevo, which is situated $12\frac{1}{2}$ miles westward of Bito point, is about $1\frac{1}{2}$ miles in extent, with two shoal heads, the north-western of which has one fathom and the south-eastern 2 fathoms on it; the depths around are 11 and 12 fathoms.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Daga reef, lying $1\frac{1}{2}$ miles northward of Cadiz Nuevo, dries at the eastern end, where there is a head above high water; the rest of the reef has sunken rocks with less than 6 feet on them.

Westward of Daga reef, the shore reef, which dries in parts, extends $2\frac{1}{2}$ miles to the northward, with a depth of $1\frac{1}{2}$ fathoms at its extreme; outside, and near the edge of the reef, is a detached rock with less than 6 feet on it, and at one mile north-west of the extreme of the reef is a similar sunken rock, which has a depth of $4\frac{1}{2}$ fathoms westward of it.

Sacramento reef (*Lat. 11° 5' N., Long. 123° 18' E.*), with less than 6 feet over it, and 11 to 13 fathoms around, lies S. 89° E. about $8\frac{1}{2}$ miles from Anauayan island and $6\frac{1}{2}$ miles from the northern coast of Negros.

The north point of Negros island is an extensive, rounded, sandy cape; it is surrounded by a shoal extending 2 miles to the northward, with a rock awash on its north-eastern edge.

Ilakaon islet is a small, low, partly-wooded islet lying on the south side of a detached reef, situated $2\frac{1}{4}$ miles northward from the northern extremity of Negros. The reef is about 2 miles long east and west and three-quarters of a mile wide, and the islet is situated about half a mile from the western end.

For shoal $2\frac{1}{2}$ miles north-westward of Ilakaon, *see* page 363.

Coast.—From the north point to Tomonton point, 16 miles west-south-west, the shore is a long sandy beach, with a depth of 3 fathoms at the distance of half a mile to 2 miles from it, at the edge of a shallow bank. Two detached patches, with $2\frac{1}{2}$ and 3 fathoms water on them, are situated N. by E. $2\frac{1}{2}$ miles and N.W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles, respectively, from Manapla, near the north end of the island, consequently this part of the coast must be approached with caution. The towns of Manapla, Victorias, and several villages lie between the north end of the island and Tomonton point.

From Tomonton point a shoal extends nearly 3 miles to the north-west, upon which the depth is from one to $1\frac{1}{2}$ fathoms. Its outer extreme is marked by a black can buoy. Vessels navigating Iloilo strait must give this point a berth of $3\frac{1}{2}$ miles (*see* page 368).

From Tomonton point to Pandan point, 24 miles south-south-westward, the coast recedes, forming a wide bay about 5 miles deep, and is low, and bordered by a long sand beach; it is faced by extensive mud flats, the 3-fathoms curve being more than one mile from the shore in most places; off Silay the bank is very shoal, there being a depth of one fathom at its edge, $2\frac{1}{2}$ miles from the shore, W. $\frac{1}{2}$ S. from the town; the channel into Silay passes northward of this.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

The town of Silay, with 15,649 inhabitants in 1903, is situated nearly 6 miles southward of Tomonton point. The church is long and conspicuous, and has a dome in the middle. There is a narrow, tortuous channel over the flats, by which small vessels can approach within half a mile of the town.

There is anchorage off Silay at the distance of $2\frac{1}{2}$ miles from the nearest shore, in a depth of 5 fathoms, with the church bearing E. $\frac{1}{2}$ S.

The town of Talisay, 4 miles southward of Silay, is small, but shows up well from seaward.

Bakolod (Lat. $10^{\circ} 41' N.$, Long. $122^{\circ} 56' E.$), the capital of Occidental Negros, lies 8 miles southward of Silay, and is conspicuous from seaward; it lies at the foot of a wide valley between high mountains. Shoal water extends a long way off in front of the town, 5 fathoms being found about 2 miles from the shore, and half a fathom at three-quarters of a mile. There is a large iron-roofed church with a tower at its southern end, and several prominent buildings.

Bakolod is a telegraph station. A cable mark-buoy is moored about 2 miles N. 61° W. from the church, and vessels are cautioned not to anchor on this line, to avoid fouling the cable.

There is anchorage off Bakolod, in 5 fathoms, about 2 miles from the shore, with the church bearing S.E. $\frac{1}{2}$ E.

Bago is a small town situated near the mouth of the Luguson river, $2\frac{1}{2}$ miles north-east of Pandan point. The Luguson river is navigable by small steamers.

Chart 2391, Iloilo strait.

Pandan point, which with Guimaras island forms the narrow strait of Guimaras (*see* page 330), is low, sandy, and covered with cocoanut trees; it is prominent when viewed from north or south. On both sides of the point the water is shoal, but the western extreme is clear and steep-to, there being 5 fathoms within a cable of the shore. The channel between Pandan point and Iogiog bank (page 331) is about half a mile wide. On the south side of the point is the town of Pulupandan. There is a telegraph station at the point.

Chart 2578, E. part of Sulu or Mindoro sea.

From Pandan point the coast continues low and fringed with cocoanut trees for 28 miles to the southward, as far as the town of Suay, near the river Himamailan. Near Suay the coast curves to the westward, and increases in elevation; about Sohoton point it is high. The shoal water which borders the south side of Pandan point extends

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

about $11\frac{1}{2}$ miles in a south-south-west direction to a position about 9 miles westward of the town of Pontevedra, where the depth is one fathom; from here it narrows in towards the coast near Makiliki point, where a depth of 3 fathoms is found one mile from the beach, and a similar depth continues southward at about half a mile from the shore.

There are several towns along the coast; two of them, Binalbagan and Himamailan, are telegraph stations.

River Himamailan.—Of the several small rivers that enter the sea on this coast, this river, near the town of the same name in the angle that the coast makes to the westward, is the most important. The entrance is indicated by stakes, placed in a depth of $1\frac{1}{2}$ to 2 fathoms, and there is reported to be a depth of 6 feet on the bar at low water; within the river the depths are from 9 to 13 feet, and the deepest anchorage is near a copse on the left bank.

Vessels desirous of communicating with Himamailan anchor about $1\frac{1}{2}$ miles westward of the river mouth, in 4 fathoms.

San Juan de Ilos is on a river which discharges about 4 miles westward of Suay. There is a large breaking shoal eastward of the river's mouth. Vessels anchor off the west end of this shoal, with the river mouth open.

Shoal.—A patch of $5\frac{1}{2}$ fathoms lies $1\frac{3}{4}$ miles north of the town of Isio and hill of Tantauayan, with a depth of 55 fathoms at the distance of $1\frac{1}{2}$ miles to the northward of it.

WEST COAST of NEGROS.—**Sohoton point** (*Lat. 9° 59' N., Long. 122° 27' E.*) is surrounded by reefs to the distance of half a mile, with a depth of 7 fathoms at the edge, and 27 fathoms at $1\frac{3}{4}$ miles to the west of the point. Makilikian point, a wooded bluff, is also surrounded by rocks. Linaon bay, between these two points, affords anchorage in case of necessity in 7 to 9 fathoms, fine sand. A rock awash at low water lies south-south-west $1\frac{1}{2}$ miles from Makilikian point, with several sunken rocks beyond it in the same direction.

Anchorage.—Along this coast anchorage may be had in case of necessity during the north-east monsoon off the following small places:—Inayauan, Cartagena, Sipalay, Campomanes, Asia, and Kalipapa.

Danhugan island, $1\frac{1}{2}$ miles north-west of Kokaguayan point, is one mile long, north and south, and is surrounded by a narrow, steep reef, which extends nearly a mile south-eastward, with an islet

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

at its extremity, the channel between which and the coast has a depth of 8 fathoms. A sunken rock lies half a mile northward of Danhugan.

Binigisian point.—Two miles north of this point, which lies 10 miles south-south-west from Sohoton point, are Anajauan island and four other little islets close to it. South of the point there is anchorage in a depth of 9 to 17 fathoms, where good water may be obtained, but the chart shows numerous sunken rocks in this vicinity extending to $1\frac{1}{2}$ miles from the shore; still farther south are the bays of Cartagena and Sipalay.

Matatindok point, about 7 miles southward of Binigisian point, is steep, with a flat crown, and is surrounded by rocks, one of which has the appearance of a vessel under sail.

Campomanes bay (*Lat. 9° 42' N., Long. 122° 26' E.*), south of Matatindok point, is clear, and of great depth, with very steep shores, there being 17 to 28 fathoms almost touching the shore. Nabulao bay, immediately south of Campomanes, is obstructed by an islet, and by a reef which extends from both sides; before it is a shoal, surrounded by deep water, situated about $2\frac{1}{2}$ miles southward of the point between the two bays.

SOUTH-WEST AND SOUTH-EAST COASTS.—From Campomanes bay to Kansilan point the shore is rocky; but it is safe to approach and steep-to, there being depths exceeding 37 fathoms at the distance of half a cable in many places. From Kansilan point to Siaton point, the south extremity of Negros, the coast is also clear and steep-to, and presents several beaches, including the mouths of small unimportant rivers. There are several villages on this stretch of coast. During the north-east monsoon vessels can anchor off the town of Tolon, but boats can only enter the river at high water.

From Siaton point to Dumaguete point the shore is sandy and clear, with depths of $2\frac{3}{4}$ to 6 fathoms at one cable from it, falling then abruptly to 32 fathoms.

Port Bombonon, one mile north-west of the point of the same name, is 2 miles in length, has a depth of $5\frac{1}{2}$ fathoms, and is completely sheltered; but the entrance is reduced to a width of 75 yards and a depth of $2\frac{3}{4}$ fathoms by a ridge of rocks extending from the south shore.

Port Siit is small but clear, with good holding ground, and sheltered; the depth within is from $3\frac{3}{4}$ to 8 fathoms, and there is a rivulet with good water.

Samboanguita point is flat and sandy; a shoal of $1\frac{1}{2}$ fathoms extends to the distance of 2 cables from it. South of the point there is

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

good anchorage in a depth of 7 fathoms. The town of Samboanguita is situated one mile inland of the point.

Dauin point is sandy and flat, with trees on it rather higher than those that grow on the other part of the coast; it can be passed close-to, being clear and steep—as is also the entire coast between Samboanguita and Dumaguete points.

Apo island, lying $3\frac{1}{2}$ miles E. by S. from Samboanguita point, is one mile in length, north and south, and 393 feet in height; it is clear and steep-to, except on its southern and western sides, which are rocky.

LIGHT (*Lat. 9° 5' N., Long. 123° 16' E.*).—From a concrete tower, 35 feet high, on the summit of Apo island, is exhibited, at an elevation of 428 feet above high water, a *white and red alternating fixed and flashing light every fifteen seconds*, thus:—*white fixed, twelve seconds; eclipse, one second; red flash, one second; eclipse, one second*, visible 16 miles in clear weather.

Current.—In the channel between Apo and the coast of Negros, the current sets constantly from north to south with variable velocity.

Dumaguete point, $7\frac{1}{2}$ miles northward of Dauin point, is a flat, salient point of sand; the Dumaguete river discharges close to the point.

Dumaguete, the largest town and the capital of the province of Oriental Negros, lies in a slight bend of the coast immediately northward of the point and river of the same name. It presents a conspicuous appearance from the sea. The exports are hemp, copra, and some sugar. The town contained 14,894 inhabitants in 1903.

Light.—A *red fixed* light, elevated 38 feet above high water, visible in clear weather from a distance of 7 miles, is exhibited from a white framework tower, 34 feet high, erected near the beach at Dumaguete. For arc of visibility, *see* Light list and chart.

Anchorage can be had off the town in a depth of from 3 to 10 fathoms, but it is bad, as the bank is very steep-to, and vessels are liable to drag off into deep water. During the north-east monsoon it is frequently untenable, and landing is at times difficult and even impracticable. Vessels usually anchor east-north-eastward of the light in about 15 fathoms. Another anchorage recommended is with the bell tower southward of the church, bearing S. 59° W., in 25 to 10 fathoms, according to the size of the vessel. A little outside the line joining Dumaguete point and the point northward of the town the depth is 25 fathoms; inshore of this the depths decrease

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

rapidly. The best boat landing is on the beach in front of the band stand. The beach is sandy, with coral bottom a short distance from the shore, but a boat will usually go over the coral unless too heavily laden.

Telegraph cables.—Dumaguete is a telegraph station, and cables are landed on the north side of Dumaguete river entrance from Oslob, in Sebu, and Camp Overton, in Mindanao.

TAÑON STRAIT, between Negros and Sebu, is 90 miles in length, 14 miles wide at the northern part, and $2\frac{1}{2}$ miles in width at the southern entrance. The shores are steep, and but little frequented.

EAST COAST OF NEGROS.—From Bito point, described at page 369, the coast trends south-eastward for 5 miles to Mokabok point, forming a bay, and is bordered by a reef which extends about a mile from it, and surrounds several small wooded islets.

Bagunbanua islet, lying $1\frac{3}{4}$ miles northward of Mokabok point, is situated on the south-west part of a reef which extends 2 miles north-west and south-east; there is a detached rocky patch, named Pamaaun reef, on which a small sandbank dries at low water, about $1\frac{1}{2}$ miles to the north of the main reef, and between them is another small reef that dries. The channel between the islet and the coast reef is $3\frac{3}{4}$ fathoms deep, with a patch of $1\frac{1}{2}$ fathoms in the middle, and is only fit for small coasters. The channel between Pamaaun reef and Molokabok island is clear.

Plan 3555, Danao river and approaches.

Mokabok point, about 5 miles south-eastward of Bito point, is about 40 feet high and fronted by a reef extending $1\frac{1}{2}$ cables to the eastward and a quarter of a mile to the northward. Westward of the point is the small town of Escalante on the shore of the bay of the same name. The town is connected with the Danao river wharf by a good road, but the bay is encumbered with reefs. Panalsalon reef, in the entrance of Escalante bay, about half a mile north-north-west of Mokabok point, dries over an extent of half a mile, and has boulders in the centre, awash at high water. Between Panalsalon reef and the shore reefs there is a passage from $2\frac{1}{2}$ to 4 cables wide, with anchorage depths of 5 to 13 fathoms.

Danao river (Lat. $10^{\circ} 49' N.$, Long. $123^{\circ} 33' E.$).—Between Mokabok and Okre points, which are both of yellow clay, is the mouth of the River Danao, with a least depth of 2 fathoms on the bar at low water, deepening within to from 5 to 12 fathoms.

General charts 2578, 943, 1263.

Plan 3555, Danao river and approaches. Var. 1° 10' E.

The channel across the bar is narrow and tortuous, and has a least width of 100 yards between the 2-fathoms lines. The river is about 3 cables wide at the entrance, but soon narrows to one cable, and varies in width from that to half a cable for a distance of 4 miles up. The general course of the river is from west to east. The banks are steep-to and good protected anchorage may be found anywhere inside the bar.

On the north bank $3\frac{1}{2}$ cables inside the entrance is a small wooden wharf with 8 feet alongside at low water, from which a road runs to Escalante, about $1\frac{1}{4}$ miles northward. No fresh water can be obtained for shipping without going about 8 miles up the river to where there is a spring.

Solitary hill, 6 miles westward of Okre point, is the only high land in the vicinity; it is 1,106 feet high, of conical form, and is a good mark for making the entrance to the Danao river

Directions.—Vessels entering Danao river should proceed with caution, as there are no buoys or beacons. The wharf and warehouse behind it are prominent, and when made out should be steered for on a S. 89° W. bearing. The outer edge of the bar will be crossed at about one mile from the wharf; from here the depths will be from 2 to 3 fathoms. When about half a mile from the wharf the water will deepen and the channel contract, and when nearly abreast the southern entrance point, the eastern headland of the creek opposite the wharf should be brought to bear S. 72° W. and steered for; when the wharf bears N. 73° W. steer a mid-channel course, and anchor off the wharf in 7 fathoms, or above it in 10 to 12 fathoms.

Tides.—It is high water, full and change, at Danao river at 0h. 0m.; springs rise about 4 feet.

Chart 2578, E. part of Sulu or Mindoro sea.

Coast.—From Okre point the coast trends south-south-westward for 17 miles; for $5\frac{1}{2}$ miles, to Arkolon point, it is bordered by reefs. South-east of Salamanca, a town $1\frac{1}{2}$ miles north of Arkolon point, a $1\frac{1}{2}$ -fathoms shoal extends a mile from the shore. From Arkolon to Calatrava, a town $7\frac{1}{2}$ miles southward, the coast is clean and steep-to; thence to Tiklin islet, $3\frac{1}{2}$ miles southward, reefs line the coast. Tiklin islet, surrounded by reefs, lies in the entrance to a small bay, and half a mile south of it and the same distance off-shore is Tiklin reef. From abreast Tiklin reef the coast trends south-westward for $7\frac{1}{2}$ miles, and should not be closely approached except in the neighbourhood of San Carlos, a small town about midway, nearly obscured by trees. Anchorage may be had southward of the point by San Carlos.

Refugio island (Lat. 10° 29' N., Long. 123° 23' E.) is about 3 miles long north and south, and half a mile wide; the north part is

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

high. The coasts, except part of the western, are fringed with reefs, those off the south end extending about half a mile. A coral reef with a depth of one fathom on it lies S. 60° E. one mile from the south end of Refugio island, with deep water between it and the reef surrounding the island. There is a rock awash three-quarters of a mile south-west of the south end of the island. A shoal of $1\frac{1}{4}$ fathoms extends over half a mile from the Negros shore westward of the south end of Refugio. The channel between the mainland and the north end of Refugio is two-thirds of a mile wide, with a depth of $3\frac{1}{2}$ fathoms, and between the island and the coast and reefs westward the depths are from $6\frac{3}{4}$ to 15 fathoms. There are several anchorages on the Negros coast westward of Refugio, where coasters load sugar.

Tidal streams.—North of Refugio the flood stream sets to the south-west, and the ebb to the north-east, but south of Refugio they set in the opposite directions.

Coal.—Layers of coal were discovered in this part of Negros in 1879, and outcrops of coal have been found in the rivers which enter the sea near the towns of Calatrava and Talabe.

Coast.—From San Carlos to Talawangan point, a distance of 14 miles, the coast is fringed with narrow reefs and some rocks, and abreast Vallehermosa a shoal of $4\frac{1}{4}$ to 8 fathoms extends about a mile off-shore. Talawangan point is steep-to, with shoal water close northward of it. Pauay point, 8 miles farther on, is flat and sandy; there is anchorage in 3 fathoms to the southward of it before the little town and River Guijulugan. Guijulugan is a telegraph station.

Rock.—A rock, awash at low water, is situated $2\frac{1}{2}$ miles South from Talawangan point and a mile off-shore; it is about three-quarters of a cable in extent and steep-to. The channel inside it is said to be safe.

Pasil point (*Lat. 10° 1' N., Long. 123° 13' E.*) is low, very steep, and surrounded by boulders; from this point to Kampoyo point the coast is steep and clear, with the exception of a reef mentioned below.

Reef.—A reef extends nearly 2 miles north-eastward from Tinaogan, $14\frac{1}{2}$ miles south-south-west of Pasil point, and fronts the shore for about 2 miles northward to a distance of $1\frac{3}{4}$ miles. This reef consists of numerous heads, one of which dries, some are awash at low water, whilst others have depths of from 2 to 7 feet over them, with deep water between the heads, and $2\frac{1}{2}$ fathoms on the northern part. There is no passage between this reef and the coast of Negros island. There is a wharf at Tinaogan.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Dako and **Diutay islands** are two high islands surrounded by sandbanks, which extend $1\frac{1}{2}$ miles to the north-east from both islands, and appear almost to fill the bight of the coast in which they are situated, between Kampoyo and Kanamay points; both these points are foul.

Bais harbour.—The entrance to the commercial harbour of Bais is northward of Dako, the southern island. Moderate-sized vessels can enter the channel, which is deep, narrow, and tortuous, and proceed to the wharf on North point, off which 18 feet will be found. The depths in the anchorage are from $3\frac{1}{2}$ to 6 fathoms. The channel is marked by red stakes on the starboard and white stakes on the port side, but their presence cannot be relied on, and mariners without local knowledge should not attempt to enter without assistance.

To enter, bring the north end of Diutay, the northern island, and the highest hill behind it in line, N. 63° W., and steer for them, which will lead to the entrance of the channel. When the reefs can be made out keep midway between them, passing close northward of Dako, and between the stakes until the wharf is reached, off which anchorage may be had in 5 fathoms at 100 or 150 yards distance. Should the stakes be gone the channel may be recognised by the colour of the water.

South Bais bay (*Lat. $9^{\circ} 33'$ N., Long. $123^{\circ} 10'$ E.*), between Dako and Negros, offers well-sheltered anchorage, in from 2 to 6 fathoms, protected from all winds. Kanamay point, on the south side of the entrance, is surrounded by a narrow reef, which projects about a quarter of a mile northward. The northern entrance point is clear, except for a reef extending S. 73° E. for half a cable.

Dangers.—There is a bank which dries at low water, the western end of which is half a mile S. 64° W. from Arboles point, the south-west point of Dako island, and on the end of the bank are Pampanga rocks. There is a deep channel, marked by stakes, between Arboles point and the bank.

A rock with 4 to 8 feet water and 3 to 4 fathoms around lies about $1\frac{1}{2}$ cables westward of Pampanga rocks on the western side of the channel.

Directions.—To enter, bring Arboles point to bear N. 67° W. and steer for it, giving the outer north entrance point a berth of 2 cables, and when the latter point bears N. 64° E., starboard and bring it astern on that bearing and anchor when the wharf at North point is in line with Pampanga rocks, N. 24° W., in about 6 fathoms, mud. Small vessels can round Pampanga rocks, avoiding the sunken rock previously mentioned, bring the wharf to bear N. 24° W., and anchor according to draught. The bottom shoals gradually, and

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

2 fathoms will be found more than half a mile northward of Pampanga rocks.

Amblan point is flat, steep, and clear; not far from it is the town of Amblan, whose inhabitants are largely engaged in the cultivation of cacao. There is anchorage before the town in a depth of 4 to 13 fathoms, sand.

Tidal streams.—The southern entrance of the strait of Tañon is narrow, being but $2\frac{1}{2}$ miles in width; the shores are steep, and the tidal streams at springs reach a velocity of 5 to 6 knots, with strong races and eddies; at neaps the rate is 2 to 3 knots. For a fuller account of these tidal streams, *see* page 387.

Charts 2577, 2578.

BANTAYAN ISLAND, 8 miles west of the north part of Sebu island, is $10\frac{1}{2}$ miles long, north-north-west and south-south-east, and 4 miles wide. The highest part, 295 feet, is near the centre of the eastern side, and is visible in clear weather at a distance of 18 miles. It is sparsely inhabited, the only municipality being Bantayan, on the south-west side of the island. The village of Madridejos is situated on Lauis point, and that of Santa Fe on Ogton point.

Lauis point (*Lat. 11° 18' N., Long. 123° 44' E.*), the northern extremity of Bantayan, is flat and sandy, and from it a rocky ledge extends nearly a mile to the northward, with 4 fathoms off its end; hence the depth slowly increases to 9 fathoms at the distance of $2\frac{1}{2}$ miles from the point. The ledge continues round the point to the eastward, with about the same width. To the westward of the ledge, and not far from the village of Madridejos on the point, small vessels can anchor in $2\frac{1}{2}$ fathoms, sheltered from the eastward by the ledge which breaks the sea. For shoal 5 miles northward of the point, *see* page 350.

From Lauis point the coast, sandy and covered by mangroves, trends south-south-west 5 miles to Kambaugai point, the western extreme of the island; shoal water, with a least depth of $2\frac{1}{4}$ fathoms, rock, extends 2 miles off this coast. From this point a reef projects three-quarters of a mile, and just southward of it shoal water under 3 fathoms extends $1\frac{3}{4}$ miles from the shore, and borders the south-west coast, closing in to it again near the town of Bantayan, the inhabitants of which are engaged chiefly in pearl shell fishing; only small coasters can approach it.

Chart 2578, E. part of Sulu or Mindoro sea.

Doong reef, dry $2\frac{1}{2}$ feet at low water and about $1\frac{1}{2}$ miles long by nearly a mile wide and steep-to, lies $8\frac{1}{2}$ miles westward of the south-west extreme of Bantayan island; patches of $2\frac{1}{2}$ and $2\frac{3}{4}$ fathoms lie $2\frac{3}{4}$ and 4 miles respectively about N. by W. of the reef, and one of

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

2½ fathoms lies about 3 miles south-west of it. For other shoal patches to the north-westward, *see* the chart.

Don islands.—An extensive shoal spreads out to the south-west of Bantayan, on which are the nine islands called Don; they are low and flat; the two southernmost of these islands, situated about 4 miles north-north-east of Molokabok island, are about 50 feet high and covered with vegetation.

Ogton point.—The south-east point of Bantayan island, Ogton, is low and flat, and has a narrow fringing reef with a depth of 10 fathoms at its edge. Anchorage during the north-east monsoon may be found southward of Ogton point in 5 fathoms. A rock awash lies 2 miles south-west of the point, and three-quarters of a mile off-shore.

The village of Santa Fe, situated at the end of Ogton point, contains a large fort and a ruined church, which are very conspicuous when seen from northward or southward.

Charts 2578, 2577.

The coast from Ogton point to Lauis point, 10 miles to the north-north-west, is sandy and foul, and offers shelter from south-westerly winds where vessels can anchor in a depth of 5 fathoms.

Jilantangan (Hilantangan) islets, the largest of which, 140 feet high, lies 2½ miles north of Ogton point, are steep-to; the channel between them and the coast is clear, but affords indifferent anchorage.

Chart 2577, Between San Bernardino and Mindoro straits:

Guintakan island (*Lat. 11° 20' N., Long. 123° 53' E.*), midway between the north point of Bantayan and the northern part of Sebu, is 3½ miles long, north and south, about one mile wide, 167 feet high, flat, and wooded; its sides are clear and steep-to, except at the north end and north-western side, where reefs extend about a quarter of a mile.

Doha shoal.—Nearly midway between Guintakan and Jilantangan islets there is a patch of 2 fathoms, with deep water in the channels on either side of it.

Malapascua island, situated 4 miles north-east of the north extreme of Sebu island, is 1½ miles in length, north and south, half a mile broad, low, and wooded; it is surrounded by a reef varying in width from one-quarter to three-quarters of a mile. On the east and west sides there are beaches of white sand, separated by rocky bluffs and mangroves. To the north and north-west of Malapascua, and close to it, are three very small islets, and at 4 cables from the south-west point are several rocks above water. Vessels can anchor in a depth of 7 to 11 fathoms, sand and mud, in the channel that separates the island from Chocolate island: and also to the northward and eastward of the island.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E.

LIGHT.—From a concrete tower, 35 feet in height, erected on the summit of Malapascua island, is exhibited, at an elevation of 110 feet above high water, a *white occulting light every nine seconds*, thus:—light, *five seconds*; eclipse, *four seconds*, visible 14 miles in clear weather.

Monad shoal.—A shoal of hard sand strewn with lumps of coral, $1\frac{1}{4}$ miles long, north-east and south-west, and about three-quarters of a mile broad, upon which the least depth is $5\frac{3}{4}$ fathoms, lies situated with the south point of Malapascua island bearing N. 74° W., distant 4 miles. Deep water surrounds the shoal, which lies 2 miles eastward of the track recommended for vessels.

Chocolate island, one mile north of Bulalaki point, the northern extremity of Sebu island, is a small circular island one cable in diameter, 250 feet high, and conspicuous. It is wooded, clean, and steep-to, with a depth of 7 fathoms close to its shore.

Charts 2578, 2577.

SEBU ISLAND.—Sebu island is situated between Negros on its western side and Leite and Bohol on the eastern; it is of some importance and interest, as its port is open to foreign commerce. It is 122 miles in length north and south, with a greatest width of 22 miles in the centre part. A chain of mountains traverses the island through its entire length, containing beds of coal. The rivers are numerous but small, and generally unfit for either navigation or irrigation. With the exception of a few fine valleys, cultivation is confined mainly to the sea-board. Sebu is the oldest place of European settlement in the group, and, for its size, the most populous of the islands; the population of the island in 1903 was 653,729, but has since increased considerably; its area is 1,742 square miles. The chief exports are sugar, hemp, and copra; the chief imports are European goods, coal, petroleum, salt, and rice. Oil has been found in two places in Sebu island.

Chart 2577, Between San Bernardino and Mindoro straits.

WEST COAST.—**Bulalaki point** (Lat. $11^{\circ} 18' N.$, Long. $124^{\circ} 4' E.$) is lower than Chocolate island, rather steep, with a flat summit covered by trees. A bank with $4\frac{3}{4}$ fathoms on it extends about half a mile east-north-eastward and south-eastward of the point. If using the channel between Chocolate island and Malapascua, Chocolate island should not be brought to bear northward of N. 61° W. inside a north and south line passing through the east point of Malapascua.

A patch of 4 fathoms lies half a mile north-westward of the point.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.

Vessels of all sizes can anchor in the channel between this point and Chocolate island, in a depth of 8 fathoms, mud, near the island, and 3 fathoms, sand, close to the point.

The north coast of Sebu is fringed with reef from a quarter to half a mile wide.

Tapilon point, about $2\frac{1}{2}$ miles westward of Bulalaki point, is a prominent wooded headland about 100 feet high. The coast between these two points is formed by low hills with an unbroken sand beach at their bases. A bank with $4\frac{3}{4}$ fathoms on it is situated half a mile off the point.

Bantigui point, the north-western extremity of the island, about $4\frac{1}{2}$ miles from Bulalaki point, is very low; a shoal of sand and rock with three-quarters of a fathom over it projects half a mile from the point. The small town of Daan Bantayan lies about one mile southward from the point.

The coast from Bantigui point to Kautit point is low, and fringed by a shoal of sand and rocks, half a mile wide off Bantigui point; narrowing to a quarter of a mile off Kautit point.

Chart 2578, E. part of Sulu or Mindoro sea.

Kautit point (*Lat. 11° 11' N., Long. 123° 56' E.*), 6 miles southward of Bantigui point, is low and sandy, and is fringed by rocks and sand covered by $1\frac{1}{2}$ fathoms water to the distance of 2 cables. Abundant fresh water is obtainable here from wells.

Jibitnil (Hibitnil) island, lying about a mile westward of Kautit point, is $1\frac{1}{2}$ miles long, north and south, and clear, ending to the south in a point of sand. Its top is a well-wooded tableland 110 feet high. In the passage between it and Kautit point the depth is from $4\frac{1}{2}$ to 25 fathoms.

Hagnaya bay, $4\frac{1}{2}$ miles south of Kautit point, is surrounded by low shores covered by mangroves; the coast is foul, and the reefs extending from it reduce the available space to a width of one mile, in which there is anchorage in from 2 to 10 fathoms. From the head of the bay a narrow, tortuous channel communicates at high water springs with Bogo bay on the east coast, reducing the isthmus here to a neck of land one cable in width, across which the natives pass their *barotos* to avoid going round by Bulalaki point. The canal is said to be filling up.

The small town of Dauagon or Medellin is situated on the coast about midway between Kautit point and Hagnaya bay.

Sabil point, forming the west side of Hagnaya bay, is a narrow tongue of sand on which there are several little steep flat-crowned

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

rocks; a shoal of 2 cables extent projects from its end. The town of San Remigio lies about $1\frac{1}{2}$ miles south-south-eastward of the point.

Mangkao point, situated 5 miles south-south-west from Sabil point, is low, and clear on its north side, but from its south part a reef extends from before the shallow River Lambusan to one mile from the shore, with a depth of 7 fathoms at its edge.

Haligay river, 10 miles southward of Mangkao point, can be entered by small coasters through a passage of $3\frac{1}{2}$ fathoms between the reefs; the depth on the bar is 3 feet at low water. The northern point is of black rock underworn by the currents. The coast from Haligay river to Tuburan river is bordered in places by a reef a quarter of a mile wide, and at Putad a bank of $2\frac{1}{2}$ fathoms extends about a mile from the shore.

Batauan bay is very small, and the greatest depth inside is only 3 fathoms; the entrance points are higher than the rest of the coast in sight about this part.

Languyon point (*Lat. 10° 44' N., Long. 123° 48' E.*), the western entrance point to Tuburan bay, is low and clear, with deep water off it. The western side is clear and steep-to, and affords anchorage.

Tuburan bay, lying eastward of Languyon point, is nearly filled with reefs. The town of Tuburan lies on the south side of the small and unimportant river of the same name which discharges at the head of this bay. The church and convent are conspicuous from seaward. Tuburan is an open coastwise port.

There is fresh water at Bolobolo, $1\frac{1}{2}$ miles south of Languyon point.

Directions.—To enter Tuburan bay, bring the church to bear S. 39° E. and steer for it, anchoring when in 6 fathoms with Languyon point bearing S. 39° W. It is not advisable to go closer in, as the whole bay is more or less foul.

Makalbang point is low, sandy, and steep-to; on the northern side is a rivulet of good water, and on the south side there is anchorage sheltered from the north-east. Between Makalbang point and Balam-ban bay the shore is fringed by a reef and shoal water, which extends off one mile in one place. The town of Asturias, containing a conspicuous church, lies on the coast $4\frac{1}{2}$ miles southward of Makalbang point.

Balam-ban bay is $3\frac{1}{2}$ miles wide at the entrance and $1\frac{1}{2}$ miles deep. The north entrance point is low and wooded with cocoanut trees, and is steep-to. The shores of the bay are fringed with reef, and foul ground extends from half a mile to $1\frac{1}{4}$ miles from the shore. The anchorage depths are from 3 to 12 fathoms, and good protection from

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

north-east winds may be found in 10 fathoms with the church bearing East about half a mile from the shore.

The town of Balamban, at the head of the bay, is a telegraph station, and contains a large church, convent, and barracks. The ruins of a large pier southward of the church are visible from the anchorage.

The town of Toledo lies on the shore about $9\frac{1}{2}$ miles southward of Balamban.

Tajao point is low, clear, and steep-to, with a depth of 23 fathoms off it; vessels can anchor south of the point in $1\frac{3}{4}$ to 7 fathoms, sand. The tidal streams that enter Tañon strait from the north and from the south meet about off this point.

Tajao bank, $1\frac{1}{2}$ miles S.S.W. $\frac{1}{2}$ W. of Bulubugan point, one mile long north-east and south-west, and half a mile wide, is a bank of rock that uncovers at low water; there is no practicable channel between it and the coast. From Bulubugan point for 5 miles southward the coast is fringed by a reef, which extends in some places to the distance of one mile.

Anchorage may be found in a break in the reef off the town of Pinamungajan, $3\frac{1}{2}$ miles southward of Bulubugan point.

The town of Aloguinsan lies 4 miles south-westward from Pinamungajan.

Gorda point (*Lat. 10° 10' N., Long. 123° 31' E.*) is high and steep, with a flat crown.

Barili bay, $3\frac{1}{2}$ miles south-westward of Gorda point, is small. Both entrance points are fringed with reefs, and the shores of the bay are skirted by mud flats which dry a long way out. There is a small round rock 5 or 6 feet high 150 yards from the shore, at the edge of the reef which fringes the south entrance point. The anchorage depths are stated to be from 5 to 16 fathoms, but almost the whole of the bay is shoal, as charted.

The town of Barili stands some distance inshore, and is not visible from the sea. The most conspicuous building to be seen is a large white iron-roofed warehouse at the mouth of the Barili river. This stream is small, and has only 2 feet on its bar at low water; it flows into the south-east part of the bay.

The anchorage may be found by bringing the warehouse to bear S. 37° E. and steering for it, anchoring midway between the entrance points, less than half a mile apart, in 11 or 19 fathoms, mud.

Tangil point, 4 miles south-westward of Barili bay, is clean and steep-to.

Dumanhug point is high, with mangroves at its base, and is clean and steep-to. The bay to the eastward has anchorage depths of from 10 to 20 fathoms, lessening to 5 fathoms near the shore.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

The town of Dumanhug is at the bottom of the bay near a small river of good water. Dumanhug is a telegraph station.

A wharf and a warehouse are on the eastern side of the bay.

Anchorage.—After entering, bring the church to bear S. 1° E. and steer for it, anchoring in about 12 fathoms, with room to swing clear of the fish weirs.

Kopton point is low, of dark rock much underworn; a reef on the eastern side half a mile in width and one extending westward from the opposite shore, nearly fill up the entrance of the bay to the eastward. The islet Pescador, 5 miles S.S.W. of Kopton point, is 30 feet high, and surrounded by dark rock, with no vegetation on it; its sides are steep-to.

The town of Moalbual lies on the south side of the isthmus connecting Kopton point with the main. The shore in front of the town is fringed by a reef nearly half a mile wide.

Badian.—This town can only be approached in boats at high water, as Badian bay, the wide bay in which it is situated is lined with reefs; a reef connects Badian island with the shore to the southward; a rock awash lies eastward of the island.

Anchorage.—Well-sheltered anchorage may be found off the south part of Badian island (353 feet high) in 7 to 11 fathoms, sand.

From Badian to the southern end of Sebu island the coast is clear, of moderate height; anchorage can be had near the shore in various places where there are towns.

The principal towns on this stretch of coast are Alegria, Malabuyok, Ginatilan, and Samboan, lying 9, 14, 19, and 22 miles, respectively, southward of Badian island. They all have conspicuous churches, which may be seen from a great distance.

Kolasi point is low, rather craggy, and white. From here to Liloan point, 3½ miles to the southward, the coast is sandy and very steep. The tidal streams are very strong off this point.

Liloan point (*Lat. 9° 25' N., Long. 123° 17' E.*), the south-west extreme of Sebu, is sandy and steep, with some rocks, covered by 1½ fathoms at a quarter of a cable from it, with 2½ fathoms outside. On the point is an old stone fort. Vessels can anchor near the point in a depth of 7 to 14 fathoms, but the bottom is steep, and the tidal streams run very strong. Between Liloan and Tañon points during flood tide an eddy current in the opposite direction passes very close to the coast.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

South entrance of Tañon strait.—From Liloan point the coast trends eastward for $2\frac{1}{2}$ miles to Tañon point, and consists of sand-beaches with a depth of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms close to. Tañon point is low and sandy, with a narrow ledge of rock projecting to the distance of one cable from it.

Tidal streams.—The flood stream or current produced by the tidal wave that enters by the strait of Surigao, passing westward between the islands Panglao and Sikijor, divides into two branches. The northernmost flows to the north-west and strikes the south-east coast of Sebu about Dalaguete point, spreading its waters north and south along the coast, so that a vessel off Dalaguete point has a flood stream favourable for going to Sebu or to Tañon strait. The stream that flows northward passes through the channel between Sebu and Bohol, and concludes its course 5 or 6 miles south of the Kamotes islands, where it meets the opposite flood stream coming south between the northern part of Sebu and Leite. The ebb stream sets in the reverse direction. The stream that flows southward meets with a part of the southernmost of the two branches just mentioned, which, striking Negros island about Dumaguete point, has also been divided into two arms flowing northward and southward; the two, reunited, enter Tañon strait by the southern entrance with a velocity that reaches 5 to 6 knots during springs and 2 to 3 knots at neaps, with violent races and tide-whirls. The stream here flows northward, lessening in force as the strait widens, until it reaches the parallel of Tajao point, where it meets the flood stream from the northward. At the northern entrance of Tañon strait the tide, even at springs, does not attain a rate of 3 knots. The ebb stream runs in a reverse direction from the parallel of Tajao point.

As a resultant of the tides there is always, on the south-east coast of Negros between the points Dumaguete and Bombonon, a constant current to the south, with varying velocity.

Off Bombonon point (*Lat. 9° 3' N., Long. 123° 8' E.*), the stream meets the flood entering from the Sulu sea, and the united waters take a south-easterly direction towards Silla and Tagolo points in Mindanao.

Chart 2577, Between San Bernardino and Mindoro straits.

EAST COAST of SEBU, from north to south.—Bulalaki point and Chocolate island have already been described. From Bulalaki point to Kampatok point, $1\frac{1}{4}$ miles southward, the coast recedes, forming a large bay filled with reefs. From Kampatok point to Bogo bay, 13 miles south-south-westward, a reef of sand and rocks fringes the shore. Kampatok reef, the northern end of which lies $1\frac{1}{4}$ miles southward of Kampatok point, is a detached reef 2 miles long, north and

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1°10'E. south, with less than 6 feet water on it, and separated from the shore reef by a narrow channel; its outer edge is 2 miles from the shore, and is steep-to.

Chart 2578, E. part of Sulu or Mindoro sea.

Bogo bay is nearly filled by shoals that extend from its sides, leaving only a narrow channel to the head of the bay where the town of Bogo is situated. The shoals are reported to show clearly, and to be marked by bushes. At about $1\frac{1}{4}$ miles from the town, where the channel makes a sharp turn southward, is a small shoal said to be marked by a white buoy. A very narrow neck of land separates Bogo bay from an inlet on the west coast of Sebu, across which the natives pass their *barotos* in preference to going round Bulalaki point.

Anchorage may be obtained in Bogo bay in bad weather, in from 5 to 8 fathoms, and vessels are recommended not to go into a less depth than 4 fathoms, as the water shoals rapidly, and the bottom consists of sand and rock; the best anchorage is a short distance southward and westward of the white buoy mentioned above, where the channel widens to about $1\frac{3}{4}$ cables. The chart shows shoal water across the entrance to the bay.

Bogo point is low, with trees in the water.

Nailon point is low, wooded, and surrounded by a narrow reef; the coast between it and Saak point, which lies 4 miles southward, is clear and steep-to, and consists of sand beaches interrupted by rocks and mangroves.

Saak point is low and wooded, clear and steep-to. A low range of hills lies about 4 miles inland, which rises to an elevation of 974 feet above the sea west-south-west of Saak point.

Capitancillo islet, which lies east $3\frac{1}{2}$ miles from Saak point, is low and circular in form, about half a cable in mean diameter, with a coral beach on its western side, which is clear and bold. On the northern side there is a narrow reef, extending to half a mile, and on the eastern and southern sides a bank extends to a distance of about three-quarters of a mile, with a depth of 18 fathoms close to the edge.

LIGHT (*Lat. 10° 59' N., Long. 124° 6' E.*).—An alternating group flashing light showing three white and one red flash every ten seconds, thus:—white flash; eclipse, one and a half seconds; white flash; eclipse, one and a half seconds; white flash; eclipse, three and a half seconds; red flash; eclipse, three and a half seconds, visible 17 miles in clear weather, is exhibited at an elevation of 98 feet above high water, from a black steel tower, 83 feet high, with white lantern,

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

on Capitancillo islet. At the base of the tower is a stone dwelling with red roof.

Reef.—At a distance of three-quarters of a mile North of Capitancillo islet is the southern end of a reef three-quarters of a mile in diameter, upon which the least depth is $2\frac{1}{2}$ fathoms. There is deep water near its edges and in the channel that separates the reef from Capitancillo islet.

Between these dangers and the coast of Sebu there is a clear channel with a depth exceeding 100 fathoms. This channel is generally used by steamers.

Kalangaman islet, lying $12\frac{1}{2}$ miles N. 72° E. of Nailon point, is small, flat, 10 feet high, and wooded; on its east and west sides are shoals which dry at low water. About 2 miles south-west of the islet is Nuñez shoal, about half a mile in extent, with a depth over it of 3 fathoms, and 18 fathoms immediately southward of it. Shoal water extends about one mile westward of Kalangaman islet, and mariners are cautioned to give it a good berth.

Ormok shoal, with $4\frac{1}{2}$ fathoms, lies $3\frac{1}{4}$ miles N. 40° E. from Capitancillo islet, shoal water extending a mile farther in the same direction.

Bantulin point (*Lat. $10^\circ 54'$ N., Long. $124^\circ 2'$ E.*), situated $4\frac{1}{2}$ miles southward from Saak point, is of uniform height, rocky, clear, and steep-to. To the north-west of the point is Tabogon bay, in which there is no anchorage, depths of 25 fathoms being obtainable at less than a quarter of a mile from the edge of the reefs, which are steep-to. The shores of the bay are covered with mangroves, and must not be approached within one cable. Managao point lies 2 miles southward of Bantulin point.

Coast.—From Managao point the coast trends south-south-westward for 5 miles to Bingkay point, and is bordered in places by a narrow reef, which continues 3 miles beyond the latter point; it is low and steep-to, consisting of sand beaches separated by rocky bluffs, which are surrounded by rocks to the distance of half a cable. The River Himuguit enters the sea about 3 miles north of Bingkay point; at the mouth of the river, very close to the shore, there is a depth of 5 fathoms, sand. The town of Borbon is on the south side of the river entrance.

Bingkay point is rocky, and steep-to; the coast between it and Binongkalan point, 10 miles to the southward, is of medium height, and consists of sand beach with anchorage off it. On this coast there are two towns: Sogod is small, and has a conspicuous church standing on a slight elevation; Katmon stands on rising ground

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

on a point midway between Bingkay and Binongkalan points. It has a large, conspicuous church with a red roof, standing in the rear and slightly higher than the rest of the town. About $3\frac{1}{2}$ miles westward of Katmon is a conspicuous gorge.

Binongkalan point is of no great height, clear and steep-to, and from it to within one mile of Port Carmen the coast is clear; from here there is a narrow shoal bordering the coast, surrounding Katadmon point and extending southward as far as the Danao river. On the outer edge of this shoal there are 8 to 17 fathoms of water over sand and mud.

Port Carmen is a small nook situated $3\frac{1}{2}$ miles southward of Binongkalan point, sheltered by the northern entrance point, the eastern side of which is foul, and there is a shoal a short distance southward from the point. The channel leading to the port is on the south side of the point, and is reduced by shoals on both sides to a width of one cable; these shoals are awash at low water, and are marked by bushes. In the channel 5 and 6 fathoms will be found, and within the port the depth is 3 fathoms, lessening towards the beach, which is low and covered by mangroves. The town is on the south-west side of the anchorage. In December, 1879, two Spanish gunboats rode out a typhoon in this port.

Directions.—In order to enter the port the land should be closed to about one mile, care being taken to avoid the reef that borders the coast, and when the fort at the head of the port bears W.N.W. a course should be steered for it on that bearing, which will lead clear of the shoals on either side. Without a pilot it would not be safe to attempt to enter at night.

Katadmon point (*Lat. 10° 33' N., Long. 124° 2' E.*), which lies 22 miles southward from Bantulin point, is very flat, and covered by mangroves. A shoal surrounds Katadmon point, whence to Danao the coast is foul.

Danao is a large town on the south side of the Danao river, which discharges southward of Katadmon point. The church is conspicuous, and stands close to the beach. There is a dilapidated wooden wharf southward of the church, and a stone pier between the church and cemetery northward. Coal abounds in the neighbourhood.

Anchorage may be found close to the shore in 5 or 6 fathoms with the church bearing N.W., but it cannot be recommended.

Coast.—From Danao to Bagakai point, 8 miles southward, the shore is sandy, and offers anchorage in a convenient depth to vessels of all sizes during the south-west monsoon.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Compostela village, 4 miles southward of Danao, is conspicuous; shoal water extends half a mile from the shore, off Kotkot point, $1\frac{1}{2}$ miles south of Compostela. About 3 miles N. 58° W. from the village, a conspicuous tree stands on a hill 1,160 feet high.

Chart 3193, Port Sebu and approaches.

Liloan, situated on the left bank of the river of the same name, 2 miles south of Compostela, is large and conspicuous; the river can be entered by boats at high water.

Telegraph.—Liloan is a telegraph station; cables are landed here from Sebu and Ormok in Leite island.

Bagakai point (*Lat. $10^{\circ} 23'$ N., Long. $124^{\circ} 1'$ E.*), $9\frac{1}{2}$ miles southward from Katadman point is low, ragged, and surrounded by rocks to a distance of one cable. The point is about 25 feet high at the extremity and rises gradually to a height of 100 feet about a quarter of a mile inland. When first seen from the northward the point makes as an island.

LIGHT.—On Bagakai point a *white flashing light every second*, visible 18 miles in clear weather, is exhibited at an elevation of 146 feet above high water, from a concrete tower 72 feet high, with white dwelling near it. For Maktan island light, *see* page 394.

Coast.—From Bagakai point the coast trends south-westward for $3\frac{1}{4}$ miles to the north-eastern point of a shallow bay, Kansaga, within the entrance of the strait leading to Sebu. A fringing reef begins at Bagakai point, and gradually widens to nearly half a mile at $2\frac{1}{2}$ miles south-west of the point, whence it narrows again as it approaches Kansaga bay.

Maktan island, forming the southern and eastern sides of Port Sebu, consists of an old coral reef, raised a few feet (8 or 10 at most) above the present sea level. The northern side of the island, for about 6 miles from the eastern point, is bordered by a low cliff. The portion of the island immediately fronting Sebu has been removed by denudation, with the exception of a few pillar-like blocks which remain, and which are conspicuous from the anchorage. The surface is scooped out into irregular basins and sharp projecting pinnacles, and covered in all directions with mud, resulting from the denudation. Nearly all the island is overgrown by mangroves, but on the part left dry there are plantations of cocoanuts.

The only town on the island is Opon, on the north-west coast, $2\frac{1}{4}$ miles south-west of Bantolinao point; the population is chiefly engaged in fishing and tending the salt pans. There is a conspicuous white tower at Opon. It was here that Magellan was killed in 1521, after making the first passage across the Pacific. Magellan's monu-

General charts 2578, 943, 1263.

Chart 3193, Port Sebu and approaches. Var. 1° 10' E.

ment stands at the head of Magellan bay, about 2 miles south-eastward of Bantolinao point.

Reefs.—From the northern part of the island on the western side of Magellan bay a ledge extends about one mile to the north-east, the edge of which is marked by fishing stakes, and the point of the reef by a black can buoy, No. 1. The north-west shore is fringed by a narrow reef; the north-east side is steep-to; the channel between Maktan and Olango island is $1\frac{3}{4}$ miles wide, clear and deep. See page 404.

The south-western side of the island is surrounded by a coral reef, from a half to nearly one mile wide, dry at low water, with deep water near its edge in most places. Lauis point, the south-western extreme of the reef, is $2\frac{1}{4}$ miles from the shore; from here the edge of the reef trends northward towards Port Sebu, passing one-third of a mile from the mangroves at the western point of Maktan; and south-eastward for about a mile and then eastward, passing half a mile outside the south point of the island, and joins the shore $2\frac{3}{4}$ miles north-eastward of that point. At high water all the reef is covered, and only a few fishermen's huts, built on great rock piles, the discoloured water, and the numerous fish traps indicate the reef, which forms the eastern side of the southern approach to Port Sebu. Shoal water extends 4 cables westward from Lauis point. Within the reef is a shallow expanse of water, with coral heads and a depth of one to 4 feet at low water, in which is Lava island, about half a mile long, north and south, and narrow.

Buoys.—The reef off the south-west side of the island is marked on its western side by two red conical buoys, Nos. 2 and 4, the southern of which, No. 2, is $1\frac{3}{4}$ miles northward of Lauis point.

PORT SEBU (Cebu harbour) is formed by the channel which separates Maktan island from Sebu, and is one of the best in the Philippines. On the north-western side of the port, about 2 miles within Bantolinao point, is Mandaue tower (*Lat. 10° 19' N., Long. 123° 57' E.*), round and white. The mudflat which extends north-eastward from Mandaue tower is covered with grass and mangroves, and is generally dry, but is overflowed at times.

Between the point westward of Mandaue tower and the town of Sebu, $3\frac{1}{4}$ miles distant, the coast recedes about one mile, forming a bay with general depths of from $1\frac{1}{4}$ to $2\frac{1}{4}$ fathoms, in which are a number of patches of less than one fathom.

The town of Mandaue lies near the shore on the eastern side of the bay; its population is chiefly engaged in sugar cultivation.

General charts 2578, 943, 1263.

Chart 3193, Port Sebu and approaches. Var. 1° 10' E.

On the south-eastern side of the port, Opon tower, white, on a jetty projecting about half a cable from the shore, is 30 feet high, and forms a good mark.

Channel.—The navigable channel, from the north-east, is narrow but comparatively straight, and is well buoyed and lighted; it is only one cable wide between the 3-fathoms lines, in the narrowest part, which is nearly abreast of Mandaue tower, and from $2\frac{1}{2}$ to 4 cables in width before the town of Sebu.

Depths.—The depth in mid-channel in the approach to the town of Sebu from the north-east varies from 5 to 11 fathoms; off the town are patches of from 3 to $4\frac{1}{2}$ fathoms.

Dangers in north-east approach.—Besides the reefs and banks on either side of the channel, there are the following shoals:—

Banilad shoals lie on the north-western side of the channel inside the 3-fathoms line. They are situated westward of the town of Opon, and a spit projecting eastward from them is marked by a red conical buoy, No. 10.

Lazarino shoal, with 3 feet of water on it, lies also on the north-west side of the channel, about one mile north-eastward of Fort San Pedro; it is marked by a red conical buoy, No. 12.

Plan of Sebu anchorage on chart 3193.

A patch of 3 fathoms lies N. 66° E. $3\frac{1}{4}$ cables from Fort San Pedro light; a shoal of $4\frac{1}{2}$ fathoms lies S. 83° E. $3\frac{1}{2}$ cables and another of $4\frac{1}{4}$ fathoms lies S. 77° E., 4 cables from the same light.

A rocky patch of $3\frac{1}{4}$ fathoms least water, marked by a red and black horizontally-striped can buoy, lies S. 73° E., $2\frac{7}{10}$ cables from Fort San Pedro light.

Chart 3193, Port Sebu and approaches.

Buoys.*—The channels are marked on the starboard side entering by red conical buoys with even numbers in white, and on the port side by black can buoys with odd numbers in white, and middle grounds by red and black horizontally-striped buoys. The buoys are said to be unreliable.

SOUTHERN APPROACH.—The southern approach to Port Sebu is between the reef extending off the south-west end of Maktan island, and the coast of Sebu and Kauit island south-westward of the town of Sebu. The port is easy of access by this channel.

Western side.—**Lipata point** (*Lat. $10^{\circ}15'N.$, Long. $123^{\circ}52'E.$*) is flat and sandy; about one mile south-westward of it is the town of Talisai.

* It is intended to erect beacons in the place of Nos. 1, 3 and 5 buoys.

General charts 2578, 943, 1263.

Plan of Sebu anchorage on chart 3193. Var. 1° 10' E.

Kauit island.—Quarantine station.—Kauit island, which was formerly connected with the mainland, is small and low, with a grove of cocoanut trees on it. The quarantine station for Sebu is on the north part of the island, and a wharf, with a depth of 3 fathoms at low water at its end, projects north-eastward from the north side. Shoal water extends nearly 2 cables east-north-eastward from the north-east point, and at one cable north-east of the point is the ruin of an old fort or castle, 10 or 15 feet high, which has been partly undermined and thrown out of level.

Chart 3193, Port Sebu and approaches.

Dangers.—Lagundi shoal, lying 2 miles south-westward of Lipata point and two-thirds of a mile off-shore, has a least depth of $2\frac{1}{4}$ fathoms on it.

Bogo shoal.—Buoy.—Bogo shoal, with less than 6 feet of water on it, lies 8 cables eastward of Lagundi shoal, and is marked by a black can buoy, No. 1.

Osteng shoal, with $4\frac{1}{2}$ fathoms on it and 9 and 10 fathoms around, lies 2 cables westward of Bogo shoal.

Lipata reefs.—Buoy.—Lipata reefs lie in the middle of the southern entrance, between Lipata point, Sebu, and Lauis point off the south-west end of Maktan island. The western and larger reef is about 3 cables in length north-east and south-west, and the centre part dries at low water. At about a cable eastward of the drying part is a patch about one cable in extent, with a least depth of $2\frac{1}{4}$ fathoms, and marked by a black can buoy, No. 3.

Narvaez reef.—Buoy.—Narvaez reef lies about $1\frac{1}{2}$ cables west-north-west from the western Lipata reef. It is of coral, with 3 feet of water on it, and is marked by a red and black horizontally-striped can buoy.

Lipata and Narvaez reefs, as well as the reef off Maktan, are marked by fishing stakes, but as the stakes are being constantly shifted they must not be relied on as marks for the edges of the reefs.

Campanario shoal.—Buoy.—Campanario shoal, covered by 2 feet of water, lies about midway between Lipata reefs and the ruin off Kauit island. It is marked by a red and black horizontally-striped can buoy. From the shoal, San Nicolas church light bears N. 13° E., $2\frac{1}{10}$ miles.

Lauis point.—See page 392.

LIGHTS.—N.E. approach.—Bantolinao point (Lat. $10^{\circ} 20' N.$, Long. $123^{\circ} 59' E.$).—A red fixed light, visible 6 miles in clear weather, is exhibited, at an elevation of 39 feet above

General charts 2578, 943, 1263.

Chart 3193, Port Sebu and approaches. Var. 1° 10' E.

high water, on Bantolinao point, the northern extreme of Maktan island. The light is hoisted between two iron supports 25 feet high, with cabin at base, all white.

Opon.—A *green fixed* light is shown at an elevation of 33 feet above high water from the white tower on the wharf at Opon, north-west side of Maktan island.

Southern approach.—Lauis point.—A *white occulting* light *every fifteen seconds*, showing thus:—light, *eleven seconds*; eclipse, *four seconds*; visible 13 miles in clear weather, is exhibited at an elevation of 54 feet above high water from a skeleton iron tower, 27 feet high, surmounting a concrete house situated on the south-western extreme of Lauis ledge, off the south-west end of Maktan island. For arc of visibility, *see* Light list.

The house is conspicuous, and stands on a platform 13 feet above high water, supported by concrete piles.

Plan of Sebu anchorage on chart 3193.

Sebu.—Fort San Pedro.—A *red fixed* light, visible 6 miles in clear weather, is exhibited, at an elevation of 54 feet above high water, from a small tower in the south-east angle of Fort San Pedro.

San Nicolas church.—A *red fixed* light, visible 7 miles in clear weather, is exhibited at an elevation of 69 feet above high water, from a hexagonal tower at the western end of San Nicolas church, situated about 8 cables westward of Fort San Pedro.

Pilots.—Pilotage is optional. The pilot stations are at Bantolinao point for the northern approach, and Lauis point lighthouse for the southern approach.

Anchorage.—The anchorage depths in Port Sebu are from 2 to 14 fathoms. Large vessels are obliged to anchor in mid-channel abreast the town in 6 to 10 fathoms. During the north-east monsoon the best anchorage for small vessels is off the long wharf in 4 fathoms; here the wind is not felt and the current is never very strong. In the south-west monsoon season good anchorage may be found in the bay northward and eastward of the fort. The holding ground is good in most parts of the harbour, but just south of the fort and near the southern reef the ground is hard and anchors are liable to drag. Vessels should moor. For convenience in determining the deviation of the compass, the true bearing of San Pedro fort light and Sebu cathedral spire in line is N. 42° 57' W.

Quarantine anchorage (*Lat. 10° 16' N., Long. 123° 53' E.*).

General charts 2578, 943, 1263.

Plan of Sebu anchorage on chart 3193.

Buoys.—The following buoys have been established to mark the approach to the quarantine station, **Kauit island**:—

A yellow conical buoy in 3 fathoms, mud bottom, about $1\frac{1}{2}$ cables N.E. $\frac{1}{4}$ N. from the north-west point of **Kauit island**.

A yellow can buoy in $3\frac{3}{4}$ fathoms, mud bottom, about $1\frac{1}{4}$ cables N. by E. from the north-east point of **Kauit island**.

Vessels approaching the quarantine station from the southward should give the ruins of the old fort on the flat extending eastward of **Kauit island** a berth of $1\frac{1}{2}$ cables, and continue northward, until the can buoy bears W. $\frac{1}{4}$ S. or southward of that bearing, before hauling westward to the anchorage.

DIRECTIONS.—Northern approach.—From a position $1\frac{1}{2}$ miles east of Bagakai point light, steer S. 48° W. for Bantolinao point light, passing about a quarter of a mile south of No. 2 red buoy and the same distance north of No. 1 black buoy; when abreast of No. 1 buoy, port a little, bringing the light on Bantolinao point, slightly on the port bow; give the light a berth of a quarter of a mile, and steer on between the buoys.

The practicable channel is about one cable wide in the narrowest part, which is south-east of **Mandaue tower**, and the depth here is 7 fathoms. In case the buoys are gone or out of position, the tide rips on the edges of the shoals and the colour of the water will indicate the channel unless the water is unusually muddy.

The towers of **Mandaue** and **Opon** are painted white, and are good marks.

When abreast **Opon tower** and about a cable from it a S. 55° W. course, with **San Pedro fort** light a little on the starboard bow, will lead to the anchorage. See page 395. Large sailing vessels require a fair wind in order to use this channel.

Southern approach.—The best channel for entering from the southward is that between **Lipata reefs** and **Lauis point**. The channels north of **Lagundi**, **Osteng**, and **Bogo shoals**, and west of **Lipata reefs** and **Campanario shoal** are not recommended.

Bring **San Nicolas church** light to bear N. 5° E. and steer for it, guarding against the effect of the tide. This course made good will lead about midway between **Lipata reefs** and No. 2 buoy off **Lauis point**, and about 3 cables eastward of the ruined fort off **Kauit island**. When **San Pedro fort** light bears N. 55° E. it may be steered for and anchorage taken up as required. See page 395.

The town of Sebu (Lat. $10^{\circ} 17' N.$, Long. $123^{\circ} 54' E.$) is the most ancient in the Philippines; it is the seat of government of the

General charts 2578, 943, 1263.

Plan of Sebu anchorage on chart 3193. Var. 1° 10' E.

province and island of Sebu, and is the residence of a bishop. It is a port of entry, and probably the second town of commercial importance in the Philippine islands. The town is built facing the strait that separates Maktan island from Sebu, on a large plain at the foot of the chain of hills that traverse Sebu island throughout its length, and is a well-constructed, thriving place; the merchants' quarter includes some well-built stone houses. The huts of the Malays, for the most part fishermen, are on the beach, and form the west part of the town. Fort San Pedro is a triangular edifice of stone situated on a prominent point, off which is the anchorage.

Sebu (*Lat. 10° 17' N., Long. 123° 54' E.*) is a telegraph station.

Wharves.—There are two small wharves for commercial use and one belonging to the Government and used by the Government vessels for coaling purposes. A new wharf has been built, 800 yards long, with a least depth alongside of 21 feet at low water.

It is proposed to construct a basin 500 yards long, with a dredged channel leading to it, for vessels of 23 feet draught.

Trade.—A considerable trade is carried on, the articles exported being chiefly hemp, sugar, and copra. The Danao coal mines have recently been sold to a German syndicate, who are preparing to work the concessions on a larger scale. The imported goods consist chiefly of rice, petroleum, cement, flour, and coal.

The neighbouring islands of Leite, Mindanao, and Kamiguin possess extensive hemp plantations, a large proportion of the produce of which finds its way to Sebu for shipment.

During 1909, 45,529 tons of hemp were shipped at Sebu. There is a British Vice-Consul at Sebu.

Shipping.—During the year 1909, 132 foreign steam vessels of an aggregate tonnage of 227,345 arrived at Sebu. Of these 92 vessels with a tonnage of 187,190 were British.

There are no harbour and light dues.

Towage is expensive, and arranged according to circumstances.

Supplies.—Provisions can be obtained; beef very bad, 50 cents per pound; fowls \$3 to \$3½ per dozen; eggs \$3½ per 100; vegetables very scarce; fruit plentiful; fish plentiful and moderate in price. Water, of good quality, is obtainable by boat at the rate of \$2½ per ton. Ice can be procured.

Coal.—In 1909, 25,716 tons of coal, mostly Australian, were imported into Sebu, and 3,200 tons were in stock in 1907; the coal is brought off in bulk, and the process of coaling is slow. About 300 tons can be loaded in 24 hours, and the price is 19 Mexican dollars per ton. Labour is fairly plentiful.

General charts 2578, 943, 1263.

Plan of Sebu anchorage on chart 3193. Var. 1° 10' E.

Repairs.—Ordinary engine repairs can be executed. For patent slip, *see* Appendix II.

Communication.—There is a regular line of steam vessels running from Hong Kong to Sebu, by which imports of all kinds are brought direct from China, Europe, and the United States. A railway has been opened connecting Sebu with Danao to the north and Argao to the south.

Telegraph.—Sebu (*Lat. 10° 17' N., Long. 123° 54' E.*) is in telegraphic connection with Iloilo and Manila by submarine cable; also with Leite, Negros, Mindanao, and Sulu. *See* page 4.

Tides.—It is high water, full and change, at 11h. 3m.; springs rise 5 feet. The greatest range of tide occurs generally in June and December, and is about 6 feet. The smallest range is about 3½ feet, generally in March and September.

The phases of the moon have but slight influence on the time of high water or on the tidal range.

The highest tides follow the moon's greatest north or south declination; the lowest tides follow the moon's least declination. At the moon's greatest north or south declination there is only one flood and one ebb in the 24 hours; at the moon's least declination there is one flood and one ebb in 12 hours.

The mean tide level varies during the year about 7 inches. It is lowest in February and highest in August.

Tidal streams.—The streams take the direction of the channel, flood to the north-east at the maximum rate of 1·8 knots an hour, and the ebb to the south-west at the maximum rate of 1·7 knots. During the flood there is a strong eddy off the fort.

The times of slack water coincide closely with those of high and low water at Sebu. At high water stands there is usually a period of about 2 hours of variable currents, from a quarter to half a knot, swinging gradually through south, and at low water stands there is a similar period with the currents swinging through north. Maximum velocities are usually midway between high and low water.

When the *Challenger* was at Sebu it was noticed that the ebb, or south-going stream, immediately following the moon's superior transit, ran with far greater strength than either of the other two tides; the velocity at its greatest strength was 2 miles an hour.

Typhoon signals are displayed from the signal station in accordance with instructions received from the Manila observatory. *See* page 6.

General charts 2578, 943, 1263.

Charts 2577, 2578. Var. 1° 10' E.

Directions for navigating from Hintotolo channel to Sebu.—From a position 2 miles south of Hintotolo a course of S.E. by E. $\frac{1}{2}$ E. will lead 2 miles outside of North Gigante, but close southward of a shoal of 4 fathoms lying about 4 miles north-westward of that island, which should be avoided, and north of (but close to) Tanguingui islet, to midway between Malapascua and Chocolate islands, but allowance must be made for the set of the current, which varies according to the strength of the monsoon. Malapascua can be passed on either side; if intending to pass between it and Chocolate island, which is the more customary route, pass Chocolate island close and continue about S. 60° E. until the east side of Malapascua bears N. 1° W. From here steer S. 3° W. for Capitancilla islet light, and keep it on that bearing when sighted until 8 miles distant from it, then alter course to pass between Capitancillo islet and the coast of Sebu. There is said to be a considerable indraught at times into Bogo bay, which must be guarded against. After passing Capitancillo islet haul to the eastward until it bears N. 1° W. and then steer S. 1° E. When the light on Bagakai point is sighted steer to give it a berth of $1\frac{1}{2}$ miles, and when it bears West, steer for Bantolinao point light, where pilots are in attendance. For further directions, see page 396.

Chart 2578, E. part of Sulu or Mindoro sea.

South-east coast.—From Lipata point to Tinaan point, 7 miles west-south-west, the coast forms a bay in the centre of which is the town of Minglanilla; the entire bay is obstructed by shoals which extend to $1\frac{1}{2}$ miles from the shore; the channels amongst these shoals, and between them and the coast, have a depth of less than 3 fathoms.

Plan of Tinaan anchorage on chart 3193.

Naga is a large town with a handsome church. Steam vessels and coasting craft make Naga when approaching the south entrance to the port of Sebu.

Anchorage, but of small extent, may be obtained off Naga in a depth of 4 to 7 fathoms, but care must be taken to avoid a small sunken rock covered by $2\frac{3}{4}$ fathoms water, which has a depth of 9 fathoms within a boat's length of it.

Tinaan anchorage (*Lat. 10° 11' N., Long. 123° 44' E.*), situated about $1\frac{1}{2}$ miles south-west of Naga, in front of a small village (without a church) difficult to distinguish, has anchorage depths of from 4 to 12 fathoms, and is protected by a shoal which lies half a mile south-east of the village. This shoal is 6 cables in length east-north-east and west-south-west and 2 cables wide; its extremities and the points of the bay are marked by stakes. In the middle of the bay

General charts 2578, 943, 1263.

Plan of Tinaan anchorage on chart 3193. Var. 1° 20' E.

there is a depth of 11 fathoms, sand, lessening gradually to $2\frac{3}{4}$ fathoms at one cable from the wharf. The north entrance is easier and cleaner than the south entrance, in the middle of which there is a patch of $5\frac{1}{2}$ fathoms. Tinaan is the proposed port of shipment of coal from the mines of Uling and Alpako.

Chart 2578, E. part of Sulu or Mindoro sea.

Coast.—From Tinaan to the salient point of Argao, the coast is fringed by a reef of sunken rocks which extends from it in places to a distance of about 8 cables; it is very steep, with deep water at a short distance from it. In passing along this part of the coast of Sebu it is advisable to give the land a moderate berth.

San Fernando is a town situated about 2 miles south-west of Tinaan, and some distance inland.

Karkar point and bay.—The point is low and fringed by rocks extending 5 cables off, with depths of 20 to 40 fathoms near. The bay has an islet in its centre, which, with the shoals extending $1\frac{1}{4}$ miles from the shore, forms a small sheltered port. The church of Karkar is situated conspicuously on a hill north-north-west of the islet. The entrance channel to the port runs north-west and south-east, and has a depth of $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms; within, the depth is 7 fathoms. The best anchorage is near the north part of the islet. An acquaintance with the locality is necessary, as the sides of the entrance are not marked by bushes; the shores are low and covered by mangroves.

Sibonga, 4 miles south of Karkar bay, affords good anchorage sheltered from westerly winds, in a depth of 4 fathoms, sand, at equal distance from the court-house and church; northward of this position the bottom becomes rocky, as is also the coast hence to Karkar bay. There is a telegraph station at Sibonga.

Argao point (*Lat. 9° 53' N., Long. 123° 36' E.*), situated 27 miles south-westward from the entrance to Port Sebu, is low, flat, and thickly wooded. It projects $1\frac{1}{2}$ miles eastward, and is very prominent when seen from northward or southward. A shoal with $2\frac{3}{4}$ fathoms on it extends one mile southward of Argao point. Small vessels load here in both monsoons, choosing their anchorage north or south of the point as most convenient. Temporary anchorage may be taken up off the end of the point in 12 fathoms, with the church, a conspicuous building, bearing about North-west. The point is clean, with a depth of $5\frac{1}{2}$ fathoms off it. Argao is connected with Port Sebu by railway.

Telegraph.—Argao is a telegraph station; the cable from Bohol island lands here.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Dalaguete point, 8 miles south-south-westward of Argao point, is flat, sandy, thickly wooded, and is surrounded by a narrow shoal with $3\frac{1}{2}$ fathoms outside it. At $1\frac{1}{2}$ miles north of the point a shoal of $2\frac{1}{2}$ fathoms extends about one mile from the shore. Anchorage may be obtained north or south of the point in, respectively, $3\frac{1}{2}$ or 18 fathoms, sand.

The town of Dalaguete may be known by a conspicuous church visible at a great distance from the northward and eastward, but both town and church are obscured by trees when approaching from the southward.

The coast between Points Argao and Dalaguete consists in some places of clean and steep sand beaches, and in others of mangrove patches with shoals extending to a short distance from the shore, except in the case of the shoal mentioned above.

Tidal streams.—The flood stream from the eastward strikes the coast about this part of Sebu, and is divided into two streams which follow the coast—one to the north-east through the channels on either side of Maktan island, the other to the south-south-west passes round the south end of Sebu, and enters Tañon strait. The course of these streams is more fully described on page 387.

The coast from Dalaguete point to Bolho-on, a distance of $8\frac{1}{2}$ miles, is low, with steep sand beaches interrupted by rocky bluffs. Between these places are the towns of Alkoï and Mambagi; the shore before Mambagi is clean, with a depth of 13 fathoms off it.

Mambagi shoal (*Lat. 9° 40' N., Long. 123° 31' E.*), of sand and rock, is one-third of a mile long, and a little more than a cable wide, with depths of $4\frac{1}{2}$ to 11 fathoms round its edges. It lies about one mile off the coast and $2\frac{1}{2}$ miles N.E. by N. of Bolho-on bluff. Dalaguete point kept westward of North leads eastward of the shoal.

Bolho-on bay is small and very steep, there being a depth of 12 fathoms within half a cable of the shore. A little to the north of the bay is a white peaked rock of a good height, Bolho-on bluff, on which there is a little stone tower. The town of Bolho-on is surrounded by a wall and fortifications.

Yuisan point, 4 miles south of Bolho-on, is low, and ends in sand and rocks close to the shore: the village of Nueva Caceres, on the south side of the point, is small.

The coast between Points Yuisan and Oslob is sand beach fringed by reef a quarter of a mile wide, steep-to.

Yuisan shoal, of sand and rock awash at low water, and with depths of 2 to 5 fathoms round its edge, is 2 cables in extent, and lies less than a mile off the shore, with Nueva Caceres church bearing N.N.W.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Oslob point, $3\frac{1}{2}$ miles southward of Yuisan point, is sandy, low, thickly wooded, and fringed by reef to the distance of a cable; it has on it a fort of white stone, visible at a considerable distance. On the south side there is anchorage in a depth of 4 to 9 fathoms. Shoal water with a depth of $2\frac{1}{4}$ fathoms extends off the point about a mile to the south-eastward.

The town of Oslob is straggling and nearly concealed by trees; the church has a tile roof and a large tower at the eastern end, and is very conspicuous. Oslob is a telegraph station, and is connected with Dumaguete by cable.

From Oslob point to Tañon point, which lies south-west 9 miles from it, the coast land is high, with sandy beaches and rugged bluffs of white rock, and is very steep.

Tañon point, the southern extreme of Sebu island, is low, sandy, and surrounded by reef a little more than a cable wide. There is anchorage south of the point in a depth of $5\frac{1}{2}$ to 7 fathoms, sand; but it is exposed to the force of the tidal streams that enter and leave the strait of Tañon. The church and village of Tañon (Santander) are on high ground near the point. The church is very conspicuous, and has steps leading down to the shore.

Sumilon island lies E.N.E. $3\frac{1}{4}$ miles from Tañon point, and three-quarters of a mile off the coast. It is two-thirds of a mile long, 177 feet high, and well wooded; there is a conspicuous stone tower on the bluff at the eastern end. Its shores are clean and steep-to, and the channel between the island and Sebu is deep and clear.

BOHOL ISLAND is of oval figure, 48 miles in length north-east and south-west, and 36 miles in maximum width, with an area of 1,441 square statute miles; the southern part is hilly and rocky, but the northern part has good tracts of level ground. The highest points in the island are two mountains on the south side, 2,630 and 2,059 feet high, about 4 miles from the sea. The coasts of Bohol are bordered by reefs, which on the northern side of the island extend to a distance of about 12 miles.

The productions of the island are cacao, tobacco, cotton, Manila hemp, rice, maize, and sugar-cane; and its forests furnish excellent wood. The district of Bohol includes the islands of Sikihor and Panglao, and in 1899, according to the Philippine Commission, contained about 248,000 inhabitants; the seat of Government is at Tagbilaran on the south-west coast.

Lapinin island (*Lat. 10° 7' N., Long. 124° 33' E.*), on the north-east extremity of Bohol island, is separated from it by a narrow channel in which the depth is about 2 fathoms; the island is

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

7½ miles long, 406 feet high, and a narrow, steep bank partly surrounds it. Tugas point, the north-east point, is steep-to; a shoal of 4 fathoms lies 3 miles South from it, and one of 2½ fathoms off the south-east side; see the chart.

The islet Tinuibo, lying 2½ miles south-eastward from the northern point of Lapinin island, is small, clean, and steep-to. Between the islands there is a depth of 12 fathoms.

North coast of Bohol. — **Danahon bank** forms the outer limit of the coral reef that borders the north coast of Bohol, and is composed of a great number of shoals and islands, between which only small vessels with a good local pilot can navigate. The eastern end of the bank lies 7 miles N. by E. ¾ E. from the north point of Lapinin island, and 6½ miles from the coast of Leite.

The bank has two openings through it; the northern channel (*Lat. 10° 19' N., Long. 124° 28' E.*) is in a line between Mount Kogton in Bohol and Mount Three Peaks in Poro island (Kamotes); and the western opening lies N. 61° W. of Mount Corte; both of these openings have a width of about a mile, and a depth of 5½ and 7 fathoms, respectively. On the bank at great intervals there are small islands covered by bushes and mangroves.

Directions.—To pass through the northern channel, stand in on the line joining Himukitan and Nanu islands, N.E. ½ E. and S.W. ½ W.; this line passes close to the reef extending westward from Bilanbilangan island, off which, however, there is a sufficient depth of water. A small fishing hut is situated on a low sandbank on the western side of the passage. The line joining Mount Three Peaks and Mount Kogton crosses the first line in the middle of the channel.

Islands and reefs.—No detailed description of the numerous islands and reefs that encumber the large space lying between the Danahon bank proper and the north coast of Bohol can be given: the chart should be referred to, and local knowledge is absolutely necessary for navigating among them.

The water along the Bohol coast is muddy, the bottom being seldom visible in a depth greater than 1½ fathoms. The reefs generally show reddish brown in the sunlight, and are difficult to distinguish from cloud shadows; an occasional reef shows up white.

Channel between Danahon bank and Leite.—The channel between the eastern end of the Danahon bank and the west coast of Leite is 6½ miles wide, but it is obstructed by Kanigao island, Adam, Eve, and Cain reefs. Owing to the lack of suitable landmarks the only safe passage is that between Kanigao island and Leite. This passage has a navigable width of nearly a mile, with a depth of 6¼ fathoms in it.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Kanigao island lies one mile from the coast of Leite, and $5\frac{1}{2}$ miles north-westward of Green point; it is 3 cables in extent, low, and covered with cocoanut trees. It lies on the north-eastern edge of a reef one mile long, north and south, and nearly half a mile wide at the southern end.

LIGHT (*Lat. 10° 15' N., Long. 124° 45' E.*).—A red fixed light, elevated 70 feet above high water, and visible 9 miles in clear weather, is exhibited from a white framework tower 60 feet high, erected on the north-eastern point of Kanigao island.

Adam reef is $1\frac{1}{2}$ miles long north and south and a quarter of a mile wide, with a least depth of 2 feet on it. It lies about $2\frac{1}{2}$ miles westward of Kanigao island.

Cain reef, of small extent, with a least depth of 4 fathoms, lies $1\frac{1}{2}$ miles west-north-west of Kanigao island.

Eve reef, lying $1\frac{1}{2}$ miles S. 60° W. from Kanigao island, is of small extent, with a least depth of $3\frac{1}{4}$ fathoms.

Abel reef, covered by a least depth of $3\frac{3}{4}$ fathoms, is situated with the west side of Kanigao island bearing N. 1° W., distant 2 miles.

North-west and West coast.—**Getafe village.**—Vessels of about 16 feet draught can find anchorage off Getafe, near the north-west point of Bohol, between the village and Handayan island to the northward, in a depth of from 4 to 7 fathoms, mud. Narrow reefs extend from both the mainland and island, but the anchorage may be safely approached by keeping midway between them.

Olango island, situated north - west of Bohol, is low and flat, 4 miles long, north - east and south - west, and $1\frac{3}{4}$ miles wide at its southern part, which is the widest. A steep reef surrounds it, extending half a mile from the eastern and western shores, and $4\frac{1}{2}$ miles to the south-west, with several islets on it. Hilutangan channel which this island forms with Maktan is $1\frac{3}{4}$ miles wide—deep and safe—and is often used in preference to Sebu strait. The channel east of Olango, between that island and Danahon bank, $1\frac{3}{4}$ miles in width, is also practicable and deep.

Islets and reefs.—The Danahon bank continues south-westward from the western opening (page 403) for 18 miles, and has on its reefs Kabulan, Koamen, and Mokabok islets, and an islet and a rock south-westward of the latter, lying from 5 to $7\frac{1}{2}$ miles from the coast of Bohol. The south-western part of the bank has general depths of $3\frac{1}{2}$ to 9 fathoms, and at $1\frac{1}{4}$ miles within the south end, and $6\frac{1}{2}$ miles S. 47° W. from Mokabok is a shoal of $2\frac{1}{2}$ fathoms. There is a narrow, deep channel through the bank northward of the southernmost islet. Between these islets and the coast of Bohol are numerous islets and

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

shoals, which will not be described—their positions are best seen by reference to the chart. Great care should be exercised when navigating in this vicinity.

Panganagan island, lying near the coast, is of no great height; it is foul and surrounded by a steep reef. The little port of Kalape, the entrance to which is very difficult and dangerous, is between the island and the coast.

Kabilao island, separated from the coast of Bohol and Panganagan island by a deep channel, is triangular in shape, about 2 miles in extent, and 112 feet high. A narrow reef surrounds it except on the western half of the north side; the western side is rocky, rugged, and steep; the northern and eastern sides present sand beaches and rocky bluffs.

Tidal streams.—The flood stream makes to the northward, and the ebb to the southward with great force.

Loon point and town, or the point of the mole, is terminated by a sand beach, on which is a rampart; it is foul and surrounded by great detached rocks. The mole is 328 yards long, and the town is reached by steps cut in the rock. Between this mole and a peninsula to the northward is a little bay, where sheltered anchorage may be had from winds between North and S.E., in a depth of $3\frac{1}{2}$ to 9 fathoms, mud. The town is situated on the western slope of the Kanmanok hills at a good height, and presents from the sea a very picturesque aspect; it is defended by a fort with bastions at the angles.

Telegraph cable.—Loon is a telegraph station; the cable from Argao, Sebu, lands southward of the mole.

Point Cruz (*Lat. 9° 44' N., Long. 123° 47' E.*), 4 miles south of Loon, of no great height, is rocky and underworn, and presents the appearance of a wall. A ledge extends 2 cables from it with a depth of 11 fathoms at the edge, offering bad anchorage.

Maribohok bay, in the elbow which the coast forms east of Point Cruz, is foul, and lined by a steep reef extending nearly a mile before the Abatan river, and continuing along the coast until it joins the reef of Panglao island. The town of Maribohok, in the centre of the bay, is on ground of slight elevation; it contains a large church, which is plainly visible from all parts of the bay.

Shoal.—At $3\frac{1}{2}$ miles south-eastward of Point Cruz and at $1\frac{1}{2}$ miles from the coast there is a rocky shoal surrounded by depths of 9 to 14 fathoms.

River Abatan.—The mouth of this river, which discharges about 2 miles south-eastward of Maribohok, is of good width, and there is a depth of 5 feet on the bar at low water; the bar is generally

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

marked by stakes. The north point is flat, and covered by mangroves, and has a reef off it; the south point has a little rocky islet off it, covered by mangroves. The town of Cortes stands on a little hill near the sea and close to the mouth of the river.

Paminuitan hill, 326 feet high, is a small conical hill near the coast, about $1\frac{1}{2}$ miles southward from the mouth of the Abatan river.

PANGLAO ISLAND generally is low and flat, but Mount Bikuin, near its eastern point, is 646 feet high, and another hill, 319 feet high, lies behind Bolod point; it is almost joined to Bohol island, as the channel that separates them dries at low water; a reef extends off it about 3 miles to the south-west. There is no anchorage off the island. Dulho point, the western extreme, is sandy and flat, and surrounded by reef; it may be recognised at a distance by a group of cocoanut palms. Bolod point, the south-east extreme, is sandy, with a fort upon it. Katadman point is steep with a flat crown.

Balिकासag island, lying S.S.W. $\frac{1}{4}$ W. distant $4\frac{3}{4}$ miles from Dulho point, is small, flat, clean, and steep-to. The channel between it and Panglao island reef is deep, no bottom being found in it with 110 fathoms. In taking this channel it is better to keep near Balिकासag.

LIGHT (*Lat. 9° 31' N., Long. 123° 41' E.*).—A *white occulting light every ten seconds*, thus:—light, *seven seconds*; eclipse, *three seconds*; visible 12 miles in clear weather, is exhibited, at an elevation of 70 feet above high water, from a square concrete tower, 60 feet high, in the centre of Balिकासag island.

Cervera shoal is 2 cables in extent, and has 2 fathoms, coral and sand, on its shallowest part. It can be distinguished in daylight by the colour of the water. From the shoal Tahuruk point (Panglao island) bears N. 58° W. 7 miles. Less water has been reported on this bank.

Pamilakan island, lying E. by S. $\frac{1}{2}$ S., distant $10\frac{1}{2}$ miles from the south point of Panglao, is 50 feet high, and its coast is foul. The natives of Bohol resort to it for bêche de mer and turtle.

Tagbilaran strait, between Bohol and Panglao is of little importance, as it dries at low water, and can only be navigated by vessels drawing less than 6 feet. There is a stone causeway across the strait from Daus in Panglao, with a cut in it for the passage of bancas; over this cut there is a wooden bridge. The entrance is from the westward, and is generally marked by stakes.

Anchorage.—Good anchorage in 16 fathoms may be found off the eastern entrance to the strait with Tagbilaran church bearing N. 37° W., and the hill east of the town N. 19° E. There is no good

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

anchorage westward of Tagbilaran, the reef being steep-to and the bottom very irregular.

The town of Tagbilaran, the capital of Bohol, is situated on a slight elevation at the south-western extremity of that island, facing Tagbilaran strait.

The south coast of Bohol may be approached with safety, as the reef that fringes it is narrow and very steep; the little bays at the mouths of the rivers on this coast afford no good anchorage. The town of Loay is situated at the mouth of the river of the same name, about 10 miles eastward from Tagbilaran; there are several other towns along the coast.

Hagna (*Lat. 9° 39' N., Long. 124° 22' E.*).—Small vessels may find anchorage off the town of Hagna, 21½ miles east of Loay, in a depth of 7 fathoms, but the holding ground is not good.

Guindulman bay, situated westward of Napakao point, is of considerable extent, and is bordered by a reef with deep water close to it; westward of some islets and rocks in the north-east corner of the bay there is a sunken rock, with a depth of 23 fathoms just outside it. The town of Guindulman is at the head of the bay, and southward of it there is good anchorage for vessels of any size in depths of from 4 to 10 fathoms, mud and sand.

From Napakao point to Agio point, 5 miles north-eastward, the coast is bordered by a narrow steep-to bank with sunken rocks.

Kogton bay, northward of Lamanok point, is filled with reef and very shoal water. Lumitis island lies on the north side of the entrance, and some islets lie on the south side, all on the shore reef.

Kabulao bay, from 3½ to 6½ miles northward of Kogton bay, is shoal; a rock awash lies half a mile north-westward, and another, one mile southward of Tintiman island, in the north part of the bay. At 1½ miles south-east of that island is a rock awash, on the south end of a shoal 1½ miles long north and south, and a patch of 1½ fathoms lies south-westward of the rock.

Tintiman island affords good anchorage inside of it in a depth of 5 fathoms.

From Kabulao bay northward to Lapinin island the coast is bordered by a bank of coral from 1¼ to 2½ miles wide, with depths of from 3 to 4¾ fathoms, and 11 to 15 fathoms near the edge. A rock awash lies one mile from shore, 4 miles north of Tintiman island.

Shoals.—A patch of 2½ fathoms lies about 1½ miles N. by W. from Lamanok point.

At 2¾ miles N. ¼ W. from Lamanok point is a depth of three-quarters of a fathom, on the south end of a shoal bank which extends

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

3½ miles N. by E., 1¾ miles off-shore, with a rock awash near the north end; and from 2½ to 5½ miles farther in the same direction, and 3 miles off-shore, is a shoal with depths of from 3¼ to 7 fathoms; these two shoals are three-quarters of a mile wide.

SIKIHOR ISLAND, 15 miles in length east and west, and 11 miles wide, is very broken on its surface, and rises to a central peak; Mount Kudungun, at the north-east part of the island, is 1,394 feet high. The area of the island is 106 square statute miles. The productions are tobacco of superior quality, rice, and maize, though hardly sufficient for local consumption, manila hemp, and good cacao, which is bartered for wax. It is the most thickly populated island in the archipelago.

Sandugan point.—The northern part of the island is low, and surrounded by reef one cable in width; a conspicuous little hill lies near Sandugan point. The coast from Sandugan point to Port Kanoan, 3 miles to the south, is very foul, and steep near the shoals.

Tidal streams.—Off Sandugan point the tidal streams are very strong; the flood runs to the west, and the ebb to the east; but on the north-west coast of Sikihor there is an eddy stream in the contrary direction, which does not extend 2 miles off from the shore.

Plan of Port Kanoan on 949.

Port Kanoan (*Lat. 9° 15' N., Long. 123° 35' E.*) is small and the only port of refuge in the island; it extends about 3¼ cables eastward, but a sand and mud flat at the head, which dries at low water, with shoal water outside it, reduces the available length to about 2 cables. The width of the port is about 1½ cables, and both sides of the entrance are marked by low yellow cliffs. From the northern point of entrance a reef and shoal water extend rather more than a cable to the westward, with a depth of 4½ fathoms at the edge, and skirt the north side of the port at a distance of less than half a cable from the shore; the southern entrance point and south side of the port are bordered by a reef and shoal water extending about three-quarters of a cable westward and less than half a cable northward from the point and one-third of a cable from the south shore of the port. The navigable width at the entrance is about two-thirds of a cable, widening to one cable abreast the stone pier on the south side of the port in front of the town.

The depth at the entrance is 12 to 15 fathoms, lessening to 3 fathoms eastward of the stone pier. The Tayan river, crossed by a bridge, flows into the head of the port through low land liable to floods.

General charts 2578, 943, 1263.

Plan of Port Kanoan on 949. Var. 1° 20' E.

Lights.—Two *red fixed* leading lights, visible 7 miles in clear weather, lead into the port. The front light is exhibited from the centre of a triangular beacon, apex upward, painted white with a black vertical stripe in the centre, erected just northward of the bridge at the head of the harbour. The rear light is shown from the centre of a triangular beacon, apex downward, painted in the same manner as the front beacon, erected on the side of a hill, about half a mile S. 66° E. from the front light.

Directions.—To enter bring the leading beacons or *red* lights at night, in line S. 66° E. and steer for them, anchoring as nearly as possible in the centre of the harbour, in 9 fathoms, north-north-westward of the mole; small vessels can go about half a cable farther in.

Chart 2578, E. part of Sulu or Mindoro sea.

The town of Sikihor lies about 5 miles south-westward from Port Kanoan; it contains a large church and other prominent buildings, all with nipa roofs and painted white. The water in front of the town is too deep to afford safe anchorage.

Tongo and Pasigahon points, forming the western end of Sikihor island, are low, wooded, and surrounded by a reef, which advances in some places as much as a mile from the shore and extends southward to Makapilay. This reef is difficult to see, and is dangerous to approach; the depth exceeds 110 fathoms at the distance of one cable from its edge. With the exception of this reef on the west coast the shores of the island are clean and steep-to. On the south side the water is reported to be very deep near the shore, but no soundings are shown on the chart.

Lasi bay, situated between Kanaba and Karigan points, is one mile wide and one mile deep. Karigan point is a high prominent table land, and forms the eastern side of the bay. The water of the bay is deep and said to be free from danger.

Fair anchorage, well sheltered during the north-east monsoon, may be found by bringing the church to bear N.W. and steering for it, anchoring in 18 or 20 fathoms, sand; inshore of this the water shoals rapidly.

The town of Lasi, standing on an elevation in the north-western part of the bay, contains a large church and a very fine convent, both of which are conspicuous from seaward.

Minalutan bay, eastward of Lasi bay, is almost closed by a reef. The point forming the eastern side of the bay is moderately high and well wooded.

Minalutan point (*Lat. 9° 10' N., Long. 123° 42' E.*), the south-eastern extremity of Sikihor, is high, prominent, and heavily wooded,

Maria bay, between Minalutan point and Dakit point, nearly 4 miles north-westward, extends 2 miles westward. It is reported to

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

be free from danger and to afford good anchorage during the south-west monsoon. No soundings are shown on the chart.

The village at the head of the bay has a conspicuous church.

Dakit point is moderately high, well wooded, and slopes gradually towards the sea, terminating in low, rocky cliffs. There is an islet lying close to the point, with which it is connected by a reef.

Shoal.—Off the north-east coast, $2\frac{1}{2}$ miles northward of Dakit point, and $1\frac{1}{4}$ miles off-shore, there is a small bank of rock with a depth of $3\frac{1}{2}$ fathoms and very deep water around it. From this shoal Mount Kudungun bears S. 66° W.

CURRENTS.—In the eastern parts of the Sebu sea, between the south point of Panaon island and the north point of Kamiguin island, there is a constant current to the westward in both monsoons, varying in strength according to wind and tide. Vessels approaching Surigao strait from the westward should keep well over towards Panaon island to avoid being swept by the current towards Kamiguin island (*Lat. $9^\circ 16'$ N., Long. $124^\circ 43'$ E.*).

In the southern part of the sea, on the north coast of Mindanao, there appears to be hardly any tidal stream, and the currents follow the direction of the wind in both monsoons.

There appears to be a constant current to the southward between Sebu and Bohol islands, and between Negros and Sikihor. On leaving Sebu a current of 2 miles an hour was experienced by the *Challenger*. This current would appear to be by no means uncommon during the north-east monsoon, for Captain Riches of the British ship *Glamorganshire*, who happened to be at Sebu at the time of the *Challenger's* visit, and who has had much experience amongst the Philippine islands, said that he had always failed in attempting to work northward in this channel. On one occasion he struggled against wind and current for six days without making a mile, and eventually bore up and went round Negros and Panay islands, and came to Sebu from the northward in four days from the south end of Bohol. In March, 1884, the German barque *Jupiter* left Iloilo for Sebu, and endeavoured to pass west of Sikihor, but had to bear up and work up on the east side. It would be better for sailing ships to work up on the north coast of Mindanao, and make Bohol east of Sikihor island.

Tidal streams.—See page 387.

KAMOTES ISLANDS.—This group, consisting of three large islands and one small detached islet, Talong, is situated southward from Katunangan point, on the south-west coast of Leite island. They are, as a rule, fringed with narrow steep coral reefs with deep water close-to. The channel between them and Leite is clear and deep. There are no good anchorages in the entire group.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

The Kamotes islands form part of the province of Sebu, and have a population of about 21,000 distributed among four small towns and a number of villages. They are very poor and of little commercial importance, only a few sailing craft calling at the larger towns.

Pasihan (*Lat. 10° 38' N., Long. 124° 20' E.*), the westernmost island, is about 8 miles long, north-east and south-west, and 5 miles wide; the southern part of the island rises to a height of 811 feet, and near the northern end there is a small flat hill 335 feet high; between the hills there is a large brackish lake with a depth of about 2 fathoms. The town of San Francisco lies on the eastern extremity of the island; it is connected with Poro island by a bridge 50 feet long. The bays formed north and south of the town by the east end of Pasihan and the west end of Poro are nearly blocked by reefs, which dry to a distance of one mile from the bridge in either direction. Cargo for San Francisco is usually landed in front of a small white house on Puertovillo point, whence a wagon road leads to the town about $1\frac{1}{2}$ miles distant.

Talong islet, 75 feet high, is a small irregularly-shaped islet lying about 3 cables northward of the north-west point of Pasihan. The navigable channel between it and Pasihan is reduced by reefs on either side to a width of about $1\frac{1}{2}$ cables.

Poro island, lying immediately eastward of Pasihan, is nearly oval in shape, 8 miles long, east and west, and $5\frac{1}{2}$ miles wide. Mount Three Peaks, situated near the south side of the island, nearly midway between the ends, attains a greatest elevation of 1,282 feet. The coasts of Poro are fringed by a narrow steep-to coral reef, except on the north-east side, where Poro shoal extends into Kautit strait, and on the western end, where it is connected with Pasihan island by coral reefs which dry at low water. The town of Tudela and the village of Poro, 4 miles westward of it, are situated on the south side of the island.

Anchorage.—The best anchorage in the group will be found off Tudela in 7 to 15 fathoms, mud and coral. A similar anchorage will be found off Poro; both of these anchorages are exposed to southerly winds.

Hermosa bank is a very small detached bank, with a least depth of $6\frac{1}{2}$ fathoms on it and deep water around, lying about one mile eastward of Hermosa point, the eastern extreme of Poro island.

Poro shoal is a large coral reef extending about $1\frac{1}{2}$ miles from the north-east coast of Poro island. With the exception of three small patches of $1\frac{1}{4}$, $1\frac{1}{2}$, and $2\frac{3}{4}$ fathoms, the general depth over the shoal is from 3 to 5 fathoms. Small vessels will find a good 4-fathoms

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

channel between the shoal and Poro island by keeping about 3 cables from the coast.

Ponson (*Lat. 10° 46' N., Long. 124° 31' E.*), the north-eastern island of the group, lies with its north-east extreme $4\frac{1}{2}$ miles south-east of Katunangan point. It is about $6\frac{1}{2}$ miles long, north-east and south-west, 2 miles wide, and rises to a height of 726 feet. The reef that fringes its coast is nowhere over a quarter of a mile in width, except in one place on the south-east side, where there is a small bight, from which the reef extends three-quarters of a mile.

The town of Pilar is situated on the north-eastern end of the island. A stone mole 400 feet long, with a small house at the end, extends off in front of the town; there is a depth of 5 feet at the end. The village of Kaut is situated on a conspicuous sandy beach on the south-west point of the island.

Anchorage.—In fine weather indifferent anchorage may be found off the end of the mole at Pilar, north-east end of the island, in 19 or 20 fathoms.

Anchorage may be had off Kaut, south-west end of the island, but very close in on account of the great depth of water; this anchorage must be approached cautiously, as the bank is very steep. In case of necessity, anchorage may also be found off the villages of Lanao and Dapdap on the north-west coast.

Kaut strait, between Poro and Ponson islands, is about 2 miles wide, but its navigable width is reduced to about one mile by Poro shoal. The channel, which runs immediately southward of Ponson island, is clear and deep. At times the tidal streams have a velocity of from 2 to 3 knots, the flood setting south-east and the ebb north-west.

Tidal streams.—The flood stream from the northward passes from west to east in the channel between Ponson island and Katunangan point, and curves round the island to the southward. The flood stream from the southward, which has entered by Surigao strait, meets the flood stream from the northward about 5 miles south of the Kamotes group.

Charts 2577, 2578.

LEITE.—The island of Leite, one of the Visayas, situated between Sebu and Samar, is generally mountainous, but it contains, however, several large and fertile valleys. It is the eighth island in the archipelago in point of size, and has an area of 2,722 square statute miles. The prevailing geological formation is volcanic, and several of the mountains are the extinct craters of volcanoes, in which are found sulphur and other products of volcanic action; it is reported

General charts 943, 1263.

Charts 2577, 2578. Var. 1° 10' E.

that gold and iron ore have been found in the island. The mountains are covered with forest, among the trees of which is that which yields *gum-damar*, the *brea* or pitch of the Spaniards, for the production of which Leite is the most remarkable of the whole Philippines.

The climate of Leite, though hot, is healthy; hurricanes occur and do great damage. The rivers are small and unfit for navigation, but are extensively applied to irrigation. The chief productions are manila hemp and copra, and the principal industry is the extraction of cocoanut oil. Oil has been found in the island. The population in 1899, according to the Philippine Commission, amounted to about 270,500. The capital and principal port, Takloban, is on the eastern coast near the southern entrance of the strait of San Juanico, that separates Leite island from Samar.

Communication.—Leite is connected with the general telegraphic system by submarine cable to Sebu and Mindanao. See page 4.

THE WEST COAST of LEITE is in general safe and steep-to; the fringing reefs do not extend more than half a mile from the shore, except between Kanaguayan and Dulhugan points, where they extend off 2 miles. A chain of high mountains runs parallel to the coast at a distance of 4 to 5 miles inland; the highest peak of this range appears to be Mount Majuyag, a peak $12\frac{1}{2}$ miles eastward of Ormok, which rises to a height of 4,422 feet.

The western and southern coasts of Leite, from Katunangan point to Panoan strait, are now described here; the northern coast is described in Chapter VIII., and the eastern coast in Chapter X.

Chart 2578, E. part of Sulu or Mindoro sea.

ORMOK BAY.—To the eastward of Katunangan point the coast forms the great bay of Ormok; it is deep and free from dangers, the narrow reefs which fringe the shores being steep-to. Anchorage may be found all around the shores of the bay in 10 to 40 fathoms, good holding ground. Excepting off the delta of the Bao river and in the bight of Port Bello, the shores may be approached to one-third of a mile.

Port Bello, in the north-west part of Ormok bay, affords an anchorage in the south-west monsoon in 5 to 11 fathoms, mud. The village of Biasong lies at the head of the port.

Ormok, a town of 16,126 inhabitants (1903), situated in the north-eastern part of the bay at the base of a slope gradually ascending eastward, is the largest town of western Leite, and a place of some commercial importance.

Light (*Lat. 11° 0' N., Long. 124° 36' E.*).—A *red fixed* light, elevated 30 feet above high water, and visible 6 miles in clear weather,

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

is exhibited from a white concrete pillar 24 feet high, just behind the beach near the Custom-house at Ormok.

Anchorage.—The usual anchorage at Ormok is in front of the town, in 15 fathoms, hard bottom, about 3 or 3½ cables from the beach ; inshore of this the water shoals rapidly.

Tides.—It is high water, full and change, at Ormok, at 11h. 8m. ; springs rise 5¾ feet.

Telegraph cable.—The cable from Sebu is landed at Ormok.

Peaks of Aslum and Kampukan.—Aslum peak, high and remarkable, lies N.E. by E. 4½ miles from Ormok town. Kampukan peak, 2 miles N.E. of Aslum peak, is much higher and more conical than that of Aslum. Both mountains abound in sulphur and copperas.

Coast.—From Ormok, the coast trends south-easterly with a curve eastward for about 23 miles to the town of Baybay. This stretch of coast is low and consists of steep beaches of cobble stones and small boulders, with deep water close-to. Near the shore are heavily wooded hills from 1,000 to 2,000 feet high, and immediately behind them is a mountain range from 3,000 to 4,000 feet high, running parallel to the coast.

Baybay is a small town near the mouth of the Pangbaganan river ; it is a port of call for coasting steamers.

Anchorage protected from all winds except those from the westward may be found in from 12 to 15 fathoms, mud, about half a mile westward of the town.

There is good anchorage in the bay immediately south of Baybay, in from 6 to 10 fathoms, mud, inside a shoal on which the least depth is one fathom that lies off the village of Pumpungan at the head of the bay. A noticeable hill (316 feet) stands on the eastern shore of the bay.

Katarman point (*Lat. 10° 38' N., Long. 124° 46' E.*), 2¾ miles south-westward of Baybay, is fringed by a reef which extends nearly half a mile north-westward. From this point the coast trends southward for 10 miles to Amogotada point ; from Katarman point to the village of Guadalupe, 6 miles southward, the coast is coarse gravel beach backed by hills from 600 to 1,567 feet high. The water is deep close to the shore.

Reefs.—The north end of a projection of the shore reef, covered by a least depth of 1½ fathoms, lies three-quarters of a mile west from the village of Guadalupe ; it extends southward 1¼ miles to the shore, which it skirts south-eastward, with a width of about 4 cables.

Inopakan is a small town situated 8½ miles southward of Katarman point, on the north side of Amogotada point.

Amogotada point is a low flat point, fringed with mangroves and covered with cocoanut trees. It is skirted by reefs to a distance

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

of nearly 3 cables, with deep water close up to them. Mount Bontok, a very conspicuous, steep, flat-crowned hill, which rises to a height of 665 feet, lies immediately south of Amogotada point; when first seen from the northward it appears as an island, and is liable to be mistaken for the point, which is quite low.

Cuatro isles (Four islands) is the name given to a group of four islets lying off the coast of Leite, west and north-west of Amogotada point and westward of Mount Sacripante, which attains an elevation of 3,770 feet. The southernmost island, Himukitan, lies $2\frac{3}{4}$ miles westward from Amogotada point; it is 328 feet high, very conspicuous, and fringed by a narrow steep-to coral reef. Apit island, $1\frac{1}{2}$ miles north of Himukitan, is 150 feet high and fringed by a narrow reef. Mahaba islet, about 2 miles north-west of Apit, is 137 feet high and bordered by a reef, which on the south side extends nearly half a mile. Dakio islet, $1\frac{1}{2}$ miles north-north-west of Apit, is low, sandy, and 40 feet high to the tops of the trees; it is surrounded by a reef which at the north-west end extends over a quarter of a mile. The passages between these islets and between them and the coast are safe.

Coast.—From Amogotada point the coast trends southward for 5 miles to Binobolang point: thence it continues, with a deep curve eastward, for about 15 miles in the same direction to Green point, the south-western extremity of Leite. Along this stretch of coast the bottom shelves off more gradually, the 10-fathoms curve being found in some places more than half a mile from the shore.

Hindang is a small town situated about 3 miles southward of Amogotada point. The shore reef widens in this vicinity to about 5 cables. The usual anchorage for this town is about half a mile from the shore in 7 to 10 fathoms, with the church bearing S. 38° E.

The small and unimportant towns of Hilongos, Bato, Matalom, and Kajagnaan lie between Hindang and Green point.

Kanigao island.—**Light** (*Lat. $10^{\circ} 15' N.$, Long. $121^{\circ} 45' E.$*).—Kanigao island and light, together with the shoals westward and southward of it, have been described on page 404.

Green point.—**Carmen shoal.**—A sunken rock with a depth of 3 feet on it lies a quarter of a mile from the shore north of Green point, at the termination of the shore reef. The south-western coast of Leite may be rounded safely at a distance of a mile.

South coast of Leite.—From Green point the coast curves eastward $5\frac{1}{2}$ miles to the town of Maasin, and is bordered by a narrow reef; it then turns south-eastward for $13\frac{1}{2}$ miles to Taankaan point, the south extremity of the island of Leite. All the latter part of the

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

coast is formed of rocky points and small sand beaches; and is clean and steep-to except before the town of Maasin.

Maasin is a town situated on a sand beach, from which a coral reef projects some 2 cables southward and dries at low water. There is good anchorage off the eastern end of the reef in 5 or 6 fathoms. Small craft anchor farther in off the north-east point of the reef, in 3 to 4 fathoms, sticky bottom.

Tides.—It is high water, full and change, at Maasin, at 10h. 35m.; springs rise $4\frac{3}{4}$ feet.

Telegraph cable.—The cable to Surigao is landed here. It is laid from the landing across the reef to a position in 50 fathoms from which the church cupola bears N. 14° E., distant three-quarters of a mile.

Taankaan point (*Lat. 10° 0' N., Long. 125° 1' E.*) is low, and is formed of rock underworn by currents, giving it the appearance of a rampart. It is clean, with a depth of 11 fathoms off it.

Eastward of Taankaan point the coast turns abruptly to the northward for 22 miles; thence eastward 3 miles and south-south-eastward for about 14 miles to the entrance of Panaon strait, which separates Panaon island from Leite, forming an extensive gulf from 3 to 8 miles wide. The lower part of this large, deep inlet is known as Sogod bay, and the bight at the head of the inlet as Lion bay; these bays have not been examined, but they are reported to be very deep and free from danger. A depth of 9 fathoms is charted $1\frac{3}{4}$ miles westward of the western entrance of Panaon strait.

Malitbog is a small town situated on the western side of Sogod bay, nearly on the parallel of the north end of Panaon island. There is a jetty, and loading and discharging is easy; a small mooring buoy is maintained by one of the coastwise steamship companies, on account of the great depth of water off the town.

Light.—A *red fixed* light, elevated 53 feet above high water, and visible 7 miles in clear weather, is exhibited from a wooden structure on the top of the gaol at Malitbog.

Sogod Norte town lies at the north-west angle of the bay, Consolacion at the north-east angle, and Sogod Sur on the eastern side.

Limasana island, situated $3\frac{1}{4}$ miles to the south-east of Taankaan point, the southern point of Leite, is $4\frac{1}{4}$ miles in length, north and south, and three-quarters of a mile wide, and has a remarkable hill, 719 feet high, on its northern part. The island is clean, and on its south-east side there is a sandy beach, off which anchorage can be had in a depth of $2\frac{3}{4}$ fathoms at the distance of one cable from the shore. The channel between Limasana island and Taankaan point is safe.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Tidal streams.—The tidal streams run with great force here, the flood stream to the north-west and the ebb to the south-east.

PANAON ISLAND, separated from the south-east point of Leite by a narrow channel, is $17\frac{1}{2}$ miles long, north-north-west and south-south-east, and 5 miles wide at its northern part. The island is mountainous and is divided throughout its length by a range of hills terminating to the south in a mountain 2,316 feet high, the slope of which forms the southern point of the island. The eastern coast is high and rugged, and shows several cascades of excellent water. The western coast, though steep, presents several sand beaches, off which anchorage may be had in a depth of 7 to 9 fathoms, sand, but it is better to anchor in the sheltered port of Liloan at the north end of the island.

The southern entrance to Surigao strait lies between the southern end of Panaon and the northern end of Mindanao, $10\frac{1}{2}$ miles south-eastward.

Panaon strait, between Leite and Panaon islands, is about $1\frac{1}{4}$ cables wide at the narrowest point, and has a least depth, at the eastern entrance, of $2\frac{1}{2}$ to 3 fathoms, where the water is so clear that the bottom can be distinctly seen. It is reported that there is a spot of 11 feet southward of the middle of the narrows, with a channel between it and the shingle beach southward. On account of the overwhelming tidal streams no sailing vessel should attempt to pass through the strait unless in a case of necessity.

The tidal streams in Panaon strait are reported to run with a velocity of 7 to 8 knots at spring tides, with strong eddies and whirlpools at either end. The flood stream sets west and the ebb east.

Port Liloan (*Lat. 10° 9' N., Long. 125° 7' E.*) is a small town at the head of a cove on the south side of Panaon strait. It stands on a little plain with sandy shores. The inhabitants are chiefly engaged in agriculture, fishing, and gold washing.

Anchorage may be found in front of the town about $1\frac{1}{4}$ cables from the shore, in 7 fathoms, sand.

Directions.—In approaching the port from the eastward, bring the narrow part of Panaon strait open and steer in, in mid-channel; when at a good distance off a group of cocoanut palms on Liloan point will be seen. The depths increase on nearing the entrance; when a depth of 15 fathoms is obtained keep in the middle of the channel, and coast along the shore reef of Panaon until the anchorage is reached. *See* shoal of 11 feet, mentioned above, and reefs, on next page.

Entering from the westward, steer for a little hill near Liloan point with cocoanut palms and some houses on it, taking care to clear a small

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

reef extending north-westward from the entrance point, near which the depth is 26 fathoms; close the sandy point of Panaon, however, as near as prudence admits to avoid the coast of Leite, from which the shore reef projects to the south-west. The channel between the edge of the Leite reef and the sandy point of Liloan is $3\frac{1}{2}$ cables wide, and in it the depth is about 14 fathoms. Liloan point should be rounded at a distance of $1\frac{1}{2}$ cables, and anchorage taken up as previously directed.

Reefs.—A reef with 2 fathoms and possibly less on it is reported to lie about three-quarters of a mile east-north-eastward from Mangayao point, the northern entrance point of the eastern entrance to Panaon strait. The reef extends in a general north-easterly direction for about half a mile, with a deep, safe channel between it and the shore of Leite island.

A reef, the position of which is doubtful, is reported to lie about one mile eastward of Marangai point and about $2\frac{1}{2}$ miles north-eastward of the eastern entrance to Panaon strait. The reef appeared to be about half a mile in extent, and was composed of large boulders covered by from 3 to 7 feet of water.

Vessels entering or leaving Panaon strait by the eastern entrance should beware of these reefs.

NORTH-EAST COAST OF MINDANAO AND OFF-LYING ISLANDS.—**Bilaa point** (*Lat. 9° 50' N., Long. 125° 26' E.*), the northern extremity of Mindanao island, is the termination of the range of mountains that runs along the eastern coast from north to south; the point itself is of dark rock, clean, and fringed by a narrow reef.

A sandbank of $1\frac{1}{2}$ miles extent, covered by $2\frac{3}{4}$ fathoms, lies three-quarters of a mile northward from Bilaa point, from which it is separated by a deep channel half a mile wide; vessels using the channel should pass between a quarter and half a mile from the shore. During the south-west monsoon, anchorage can be found on the slope of this bank, sheltered from the tidal streams.

Coast.—From Bilaa point the coast trends E.S.E. for 4 miles to the river and town of Surigao, and consists of sand beaches and rocky cliffs, clean and steep-to.

Plan of Port Surigao on 962.

Surigao, the capital of Surigao province, stands on low land on the right bank and at the mouth of the river of the same name; it contained 7,749 inhabitants in 1903. The municipal building and clock tower are the most conspicuous buildings visible from seaward.

General charts 2578, 943, 1263.

Plan of Port Surigao on 962. Var. 1° 10' E.

The river is blocked near the mouth by the ruins of an iron bridge, which prevents large boats from entering.

Anchorage.—The anchorage off Surigao is not good. Anchorage may be taken up about half a mile from the beach in 15 fathoms, hard sand, with the flagstaff bearing S. 17° W. and the point to the left of town S. 26° E. There is also anchorage in from 10 to 12 fathoms. Coasting vessels usually anchor eastward of the town, and there is good anchorage alongside the jetty.

Trade.—The principal business is the shipment of hemp.

Telegraph cable.—The cable from Maasin is landed at Surigao.

Mails from Surigao to places on the east coast of Mindanao island are sent to Butuan, a town situated on the Agusan river on the north-west coast, and thence across the mountains to their destination.

Tides.—The tides are affected by diurnal inequality, both as to time and height. There is a difference of about 2 hours between the times of high water at Surigao and in Surigao strait. The time of high water in Surigao strait, at full and change, is, approximately, 8h. 22m.; springs rise $4\frac{1}{2}$ feet.

Bilanbilan is a small village lying one mile south of Surigao, with which it is connected by a good road. There is a wharf at Bilanbilan with 18 feet of water near its end. Most of the business of Surigao is carried on through Bilanbilan.

In the bay eastward of the wharf there is fairly protected anchorage in 9 to 11 fathoms.

Light (*Lat. 9° 47' N., Long. 125° 30' E.*).—A red fixed light, visible 6 miles in clear weather, is exhibited from a square concrete beacon, 21 feet high, erected on the reef eastward of Bilanbilan point.

Chart 2578, E. part of Sulu or Mindoro sea.

Basol island, lying 3 miles east-north-eastward of Bilaa point, is low, flat, wooded, and bordered by a sand beach; a reef surrounds the island, and extends 4 cables to the south-west. Midway between Basol and the coast the depth is 27 fathoms. The force of the tides is very strong in this channel, where they form violent eddies and whirls.

Onate rock, a pyramid 10 yards in diameter, awash at low tide, and surrounded by very deep water, lies $1\frac{1}{2}$ miles north-eastward of Basol island.

Belzibub rock is a small steep coral bank, awash at low water, lying about half a mile north-eastward of Onate rock. This rock and Onate divide the channel between Basol and Gipdo island into two passages of about equal width.

Sumilon island, $5\frac{1}{2}$ miles northward of Bilaa point, is moderately high, composed of clay and rock, and sparsely wooded. Viewed

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

from the southward it appears to be about half a mile long; a ledge of rocks extends a quarter of a mile westward, and a higher ledge, terminating in several large rocks with bushes growing on them, extends about the same distance eastward. The currents are more dangerous near this island than in the vicinity of Basol, and there is always an ocean swell.

Satan's rock, one mile east-north-eastward of Sumilon island, is small, awash at low water, and steep; it may be approached close to on the east side.

Gipdo island, off the south-west end of Dinagat island, is about 4 miles long, north-west and south-east, narrow, 1,030 feet high in the middle, and steep-to and clean on all sides except at its south-east point, from which a reef extends to a distance of half a mile.

Danaodanauan island, about one mile N.W. of Gipdo, is safe and steep-to; a rock awash at low water lies half a mile off its north shore.

The Kabilan islets are a group of four, situated $2\frac{3}{4}$ miles east-north-east of Danaodanauan, and occupying an area half a mile in extent. A small sandbank lies between these islets and Dinagat town.

The Unip group (*Lat. 10° 0' N., Long. 125° 31' E.*), lying about 5 miles north of Gipdo, is composed of the islands Sibanok, Unip, Kabakian, and several islets. The southern and western sides of the group may be coasted at a short distance without danger.

DINAGAT ISLAND, forming the eastern side of the main Surigao strait and the southern side of its entrance from the Pacific, is $36\frac{1}{2}$ miles long, north and south, and $12\frac{1}{2}$ miles across its widest part; a chain of mountains traverses the island along the east coast, the northern peak, Mount Redondo, reaching the height of 3,337 feet. The coasts are in general bold and steep-to. On the western side of the southern end are Janigad and Nonok islands, almost forming a part of the main island, being separated from it by a narrow channel only. A conical hill, 1,060 feet in height, rises in Nonok, the southernmost of these two islands. The village of Nonok is situated at the south-western end of Nonok island.

Sibale island is connected by a reef with the western side of Janigad, the northernmost of the two islands lying off the south-west part of Dinagat island, and is separated from Gipdo island by a narrow deep channel.

Rasa islet, small and flat, lies on the reef which extends southward from the south point of Nonok island; it forms the northern side of Guntuan (Ginatuan) passage, the eastern passage of Surigao strait.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Light (*Lat. 9° 48' N., Long. 125° 35' E.*).—A red fixed lantern light, elevated 10 feet above high water and visible 7 miles in clear weather, is exhibited from a concrete pedestal erected on the reef extending southward from Rasa islet. For arc of visibility, *see* Light list.

Reef.—A reef, about 50 yards in diameter, composed of large dark coral boulders, with apparently about 3 fathoms of water on it, is reported to exist about 2½ miles N. 85° W. from Rasa islet lighthouse.

Gabó channel, which separates Dinagat from the two islands to the south-west, is 1½ cables wide at its narrowest part, and has a least depth of 6 fathoms. The southern entrance is at Port Gabó, and the northern is about 3 miles south of Dinagat town; about the middle of this passage another channel branches off from it to the westward, separating the two islands.

Dinagat town is built upon a point from which foul ground extends on the south side of an unimportant bay, which has a depth of 37 fathoms at the entrance. The main industry is the extraction of gold from a mine in the neighbourhood.

The west coast of Dinagat, from the islet Kub-kub, which lies close to the coast and is clean and steep-to, runs north for 15 miles as far as Esconchada point, and can be coasted with safety; about half way lies the town of Liboho (Libjo), in a bay of no importance, open to the north-west. The Pelotes rocks, which extend northward from the south point of the bay and half way across the entrance, are steep-to; a clean and steep islet, not named on the chart, lies one mile south-west of the south point of the bay. To the northward of Esconchada point there are two bays, separated by Berrugosa point. The Twins islets lie 2½ miles N.N.E. of Berrugosa point.

Gibuson island, 4 miles north-west of Berrugosa point, is 3 miles long, north-west and south-east, narrow, and of irregular shape, clean, and steep-to. It can be passed without danger at a distance of one mile.

Malinao port, on the east coast of Dinagat, 13 miles from Desolation point, the north point of the island, is a narrow little bay penetrating to the distance of 2 miles, with a depth of 11 fathoms in the entrance, decreasing to 2½ fathoms. The entrance points are bordered by reefs; that surrounding the north point extends along the coast northward for a distance of 4 miles.

Peñascales point, 10 miles southward of Malinao port, is surrounded by rocks to the distance of half a mile.

General charts 943, 1263.

Plan of Port Gabó on 962. Var. 1° 10' E.

Port Gabó, situated at the south end of Dinagat island, is well sheltered, being protected to the northward by Mount Caballote, 1,791 feet high, and to the south by Mount Lapa, on Nonok island south-west of Dinagat. The port, which is easily made out from seaward, is 9 cables wide at the entrance, and has a good depth of water. It penetrates $1\frac{1}{4}$ miles to the westward, and then forms an elbow southward, turning into the Gabó channel. Good protected anchorage may be found in the northern part of the port, at the distance of $1\frac{1}{2}$ cables from the sand beach, in a depth of 12 fathoms. Water can be procured from the north shore of the port.

Chart 2578, E. part of Sulu or Mindoro sea.

Suluan island, 26 miles north-eastward of the northern extreme of Dinagat island, and 10 miles south-eastward from Sungi point, the south extreme of Samar, is over 2 miles in length, north-west and south-east, and one mile wide. Near the north-west point are two hills, 178 and 204 feet in height, and the eastern side of the island is formed by a high coral ridge, which attains a greatest elevation of 410 feet, and has the same characteristic features as the long ridges from Matarinao bay to Sungi point (*see* page 625). The south-western half of the island is a low plain covered with cocoanut groves.

From the north-west point a reef, partly dry at low water, extends about $1\frac{1}{4}$ miles in a south-west direction, and a similar reef about half a mile in width extends from Grenadas village to the southern part of the island; a sunken rock lies off the south point of the island. There are eight small islets and rocks, ranging in height from 7 to 163 feet, lying close to the main island with which they are all, excepting the southern two, connected by reefs. The coast on the northern and eastern sides of the island is free from dangers, and may be approached with safety to a distance of half a mile. The village of Grenadas, a barrio of Guiuan, with a population of 444, lies on the western shore.

Situated as it is to windward at the entrance of Surigao strait, and being conspicuous, it is a good point to make for when approaching the strait from the Pacific.

LIGHT (*Lat. 10° 46' N., Long. 125° 58' E.*).—A white group flashing light, showing a group of two flashes every ten seconds, and visible 28 miles in clear weather, is exhibited, at an elevation of 438 feet above high water, from a cylindrical concrete tower on the summit of Suluan island, about 5 cables from the south-eastern extreme; eclipse between flashes, two and a half seconds; between groups, seven and a half seconds.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Anchorage.—The only partly sheltered anchorage is off the south-west part of the island, in 6 or 7 fathoms, sand, about half a mile southward from the 204-foot hill on the north-west point, and about the same distance westward of the village. This anchorage is sheltered by the island and reefs from all winds except those from south-west. The best and about the only landing is on the shore inside the above anchorage. When approaching the anchorage, the south and west points of the island must be given a good berth on account of the reefs before mentioned, and when a 20-foot rock, with a sandy beach behind it, lying on the reef a quarter of a mile S. by E. $\frac{1}{2}$ E. from the 204-foot hill, bears N.E. by N., steer for it to the anchorage.

Homonhon (Malhon) island, forming the northern side of the entrance to Surigao strait from the Pacific, lies north-north-east 16 miles from the north end of Dinagat and 8 miles west of Suluan; it is a crescent-shaped island with the concave side facing northward, and is about 10 miles long, north-west and south-east, and one to $3\frac{1}{2}$ miles wide. The island attains a height of 1,120 feet in the north-western and about 700 feet in the south-eastern part. The narrowest part of the island is near the middle, where it is one mile wide and only 170 feet high. When seen from a long distance southward it appears as two islands. The island is heavily wooded with small trees, with a narrow fringe of cocoanut trees along the shore where it is not too steep for them to grow.

Homonhon is fringed by reefs, which do not extend more than half a cable, except in Kasogoran bay, the large bay on the north-east side of the island formed by the crescent shape previously mentioned, where they extend 3 cables, with a depth of 14 fathoms near. There are no outlying dangers beyond the distance of half a mile, and the island can be skirted in safety at the distance of one mile. Between Homonhon and Suluan islands are two narrow banks lying parallel with each other in a north-north-west and opposite direction, about $1\frac{1}{2}$ miles apart, and with 16 fathoms between them; the western bank has $6\frac{1}{2}$ fathoms on it, and is 3 miles long within the 10-fathoms limit; the eastern bank, $4\frac{1}{2}$ miles long, has 7 fathoms on it, and 14 fathoms between it and Suluan, from which it is $2\frac{3}{4}$ miles distant.

Homonhon island (*Lat. 10° 44' N., Long. 125° 44' E.*) is sparsely inhabited, the population being 1,224, most of whom live in the village of Homonhon, at the head of Kasogoran bay. The chief product of the island is copra.

Montokonan islet, 109 feet high, lying about half a mile from the western shore of Homonhon, with which it is connected by a reef partly dry at low water, is small, low, and covered with cocoanut trees.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

On the same reef and about 2 cables north-eastward from Montokonan is a small islet with a few bushes on it. A reef and shoal water extend about one mile southward from Montokonan.

Anchorage.—Homonhon island offers no good anchorages, and is seldom visited, except by the smaller native craft. Vessels wishing to communicate with the village of Homonhon can anchor in 23 fathoms, coral and sand, about one mile eastward of the village and about $3\frac{1}{2}$ cables off-shore. This is only a fine weather anchorage; easterly swells roll in heavily, but it is partly protected from south-east seas. Landing may be made in a break in the reef about $1\frac{1}{4}$ miles north-westward of the village; in this break there is a rock covered by one foot of water, marked by a wooden post, which should be left on the starboard hand on entering.

The best anchorage (*Lat. 10° 47' N., Long. 125° 40' E.*) at Homonhon island is eastward of the south end of Montokonan islet, in the middle of the bight, in 6 to 11 fathoms, sand; vessels are sheltered here from all winds except those between south and south-west. The clearest approach to this anchorage is found by following the western shore of Homonhon at the distance of a quarter of a mile.

SURIGAO STRAIT.—Surigao strait, the only passage for large vessels from the Pacific to the interior waters of the Philippine archipelago, with the exception of San Bernardino strait, is famous for having been traversed by Magellan when he crossed the Pacific Ocean and discovered the Philippine islands in 1521. The strait is now less frequented by sailing vessels than that of San Bernardino, which is more to windward in the north-east monsoon. It is, however, more direct and safer than that strait, but it obliges sailing vessels that take it, if they are making for Manila, to work up the west coast of Negros and Panay and the east coast of Mindoro. It is of advantage to vessels going to the southern Philippines or to the Sulu sea, and is sometimes used by steamers from Australia who wish to escape the full force of the north-east monsoon.

The main strait is safe and deep throughout its length, and the shores of the islands that border it are steep-to. The entrance to the strait from the Pacific is between Homonhon (Malhon) island to the north and Dinagat island to the south; the western side of the strait is formed by the islands of Leite (page 635) and Panaon, and the eastern side by the islands lying northward of the north-east part of Mindanao.

Steamers from the Sebu sea making for ports on the east coast of Mindanao use the eastern or Guntuan passage between Dinagat and

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Bukas islands and the main coast of Mindanao; it is also used occasionally by sailing vessels. This channel will be described below.

Winds in Surigao strait.—At the mouth of the strait the N.E. monsoon commences towards the end of September, and blows throughout October and November; in December north-east winds alternate with northerly gales. In January, winds blow from N.E. to E.N.E. accompanied by heavy rain. In February and March, easterly winds prevail. In April, May, and June, the prevailing wind is south-east, with occasional gales called *collas* from the south. In July, August, and September, *collas* from south-west are frequent.

The north-east winds, though strong, cease during the night; but winds from the south-east, south, and south-west continue to blow. It generally rains with north-north-east and east-north-east winds; the rain ceases and the weather clears with east winds, and more so with south-east winds. With south-west winds it remains clear unless a gale arises, which sometimes brings rain.

In general there is no very bad weather in this part of the archipelago, except when a typhoon occurs. The season of the year when a typhoon might occur is from the end of October to the beginning of January. They begin to blow from the north-west and finish from the south-east, having passed through either north-east or south-west; when they shift through north-east they blow the stronger, and more rain falls.

According to Maqueda, in the year 1775 three typhoons occurred in Surigao strait, and two in 1781, at the crescent and full moon. None have been observed since that time, whilst in the mouth of San Bernardino strait and the coast of Luzon several very severe typhoons have been recorded. The best authorities say that they never pass south of lat. 9°. See pages 14, 430.

Islands in Guntuan passage.—Basol and Rasa islets have already been described. See pages 419, 420.

The Guntuan (Ginatuan) islands extend to about 9 miles from the coast of Mindanao in a north-easterly direction, leaving a deep channel 2 miles wide between them and the south coast of Dinagat.

Guntuan island (*Lat. 9° 47' N., Long. 125° 43' E.*), the eastern and largest of the group, is 3 miles long, north-west and south-east, and has a small islet off its northern point; both island and islet are clean and steep-to, but the chart shows a reef extending from the east and south points. A reef with $3\frac{1}{2}$ fathoms over it lies about 4 miles S. 28° E. from the south extreme of Guntuan.

Bayatnan, the next island to the westward, is $3\frac{1}{2}$ miles long, north-west and south-east; a reef at its northern end extends one mile to the north-east, enclosing several rocks above water.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

The channel between Guntuan and Bayatnan is $1\frac{1}{2}$ miles wide; but some islets off the southern end reduce the available passage to a width of 4 cables. This channel can be used by steamers, but the passages between the western islands of the group and the coast of Mindanao are not practicable.

Kabsugan, the southernmost island, is $4\frac{1}{2}$ miles long, north-west and south-east, and is united to the coast.

Nagubat islets are two rocks, clean and steep-to, lying 7 miles south of the summit of Guntuan island.

NOTE.—The islands between Mindanao and Dinagat are reported to be incorrectly charted.

Kabgan island lies $2\frac{1}{2}$ miles south of Nagubat islets, and one mile from the coast of Mindanao. A group of four rocks lies $2\frac{1}{2}$ miles south-east of Kabgan.

Nangaba (Yangaba) islets, close to Tagonito point, form a chain of eight islets extending $4\frac{1}{2}$ miles west-north-west and east-south-east. The eastern islet, Amagadpagat, lies nearly in the middle of the channel between the coast and the south point of Bukas island.

BUKAS ISLANDS are three islands lying northward of Tugas point and so close together as almost to form one, but they are separated by narrow openings in the reefs that surround them. The western island, or Great Bukas, is irregular in outline, about 12 miles long, north and south, and traversed throughout its length by a range of hills. Its coast on all sides, except the north-eastern, where it is joined to the middle island, is clean. A small shoal of white coral, awash, lies half a mile north-east from the north-east point of this island. There are depths of 11 to 18 fathoms about one mile from the south-west coast in the channel between the island and Nangaba islands.

The middle Bukas island is 2 miles across from east to west and 3 miles from north to south, and is surrounded by a coral reef. Bukas Conical mount rises to a height of 984 feet in the southern part of the island.

The eastern island is 3 miles long, east and west, $1\frac{1}{2}$ miles wide, and is surrounded by a coral reef, which projects 2 miles to the south-east and encloses Kasulian islet; the reef is steep-to and shows several rocky heads above water.

Plan of Port Sibonga on 962.

Port Sibonga (*Lat. 9° 41' N., Long. 126° 0' E.*), at the south side of the middle island, at the foot of the conical hill, is divided into two narrow arms by an islet united to a point projecting from the south side of the island by a reef that borders the shore. The depth

General charts 2578, 943, 1263.

Plan of Port Sibonga on 962. Var. 1° 10' E.

of water in the western arm is 9 to 18 fathoms, sand and rock; in the eastern arm it is 4 to 11 fathoms. This latter arm communicates with Port Castilla, on the north side of the island, by a channel 15 yards wide and 5 feet deep, which forms the separation between the two islands.

Chart 2578, E. part of Sulu or Mindoro sea.

Port Castilla, an indentation between the reefs on the north sides of the middle and eastern Bukas islands, is open to the northward by a narrow passage; it is a little oval-shaped port of 6 cables least diameter, with an available anchorage space of a quarter of a mile in diameter, in which there is a depth of 8 fathoms.

Largo bank.—A narrow reef, extending 8 miles north-east and south-west, which dries in places, lies 3 miles south-east of the eastern Bukas island. The north-eastern extremity of it is separated from the south-east reef of Siargao island by a passage nearly $1\frac{1}{2}$ miles wide, and the south-western extremity is separated from the east coast of the western Bukas by a passage 2 miles wide. These passages, as also that between the reef and Kasulian islet, three-quarters of a mile in width, are safe and deep.

Lahanosa and **Anahauan** are two islands lying about 8 miles south of the eastern part of Siargao island, and east of the west Bukas island. They are 2 miles apart, and surrounded by reefs; some rocks lie one mile south of Lahanosa and east of Anahauan. The passage between Lahanosa and the reef south-east of Siargao is 4 miles wide, and has a depth of 18 to 23 fathoms.

SIARGAO ISLAND is irregular in outline, 19 miles long north and south, with 12 miles greatest width at the southern part, and is traversed throughout its length by a chain of mountains. It lies northward of the eastern Bukas island, from which it is separated by the Dapa channel. The northern and north-western coast is surrounded by an extensive reef to a distance of 3 miles from the shore; and from the south-east part of the island another reef projects to a distance of 4 miles, enclosing the islets Guinjang, Dako, and Janoyoy. This reef is dry in places. On the coast there are a few small towns and ports, entered by channels through the reefs. On the western coast between Ports Sapao and Kakub (*Lat. 9° 49' N., Long. 125° 58' E.*) there is a group of low islands on a reef, and several rocks show at various points on the edge of the reef.

The waters between Siargao and Dinagat islands have not been sounded, and are reported to contain a number of large dangerous reefs.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Port Pilar (*Lat. 9° 52' N., Long. 126° 7' E.*), on the east coast of Siargao, is a small circular port 6 cables in diameter, steep sided, with a large rock on the southern side united to the coast by a reef; the anchorage is west of this rock in a depth of 8 to 14 fathoms.

Dapa channel, between Siargao and the Bukas islands, is safe and deep, but narrow and tortuous; its least width, between the small islet south-west of Dapa and the one north of east Bukas, is one cable, and the depth 9 to 19 fathoms; the reefs on both sides are distinctly visible.

Kiko and Barrabas shoals lie in the middle of the western entrance. The first is one cable and the other $1\frac{1}{2}$ cables in diameter; they are steep-to and can be passed on either side. The reef off the north-east point of great Bukas island has already been mentioned.

Dapa reef extends one mile in an east and west direction, and is separated from the shore of Siargao by a narrow channel leading to the anchorage of Dapa. A small detached bank surrounded by deep water lies $2\frac{1}{2}$ cables east of Dapa reef.

Dapa anchorage is in a narrow channel between the northern edge of Dapa reef and the shore reef of Siargao; it has a depth of 4 to 5 fathoms before the town of Dapa, a small unimportant place. Neither pilots nor supplies are obtainable. The inlet north-west of Dapa is obstructed by reefs, and only fit for boat navigation.

Port Kakub, on the south-west coast of Siargao, is only half a cable wide at the entrance, but has a depth of 3 to 12 fathoms; there is anchorage before the entrance in 12 fathoms. The coast between Dapa inlet and Kakub is a mass of rock, dry at low water.

The village of Numancia is situated about 5 miles north-eastward of Port Kakub, at the head of a bay faced by low islands and reefs previously mentioned.

Port Sapao, on the north-west coast, is formed by an opening in the reef, and is of no importance.

Halian island, 7 miles N. 60° E. off the south-eastern point of Dinagat island, is surrounded by a reef which extends 2 miles to the east-north-east; the eastern edge of this reef is $2\frac{1}{2}$ miles distant from the western edge of the north-west reef of Siargao.

TIDES.—In Port Kakub there are two high and two low tides each day. The height of the tide is affected by diurnal inequality, which varies with the moon's declination. In the summer the day tide is the highest, and in the winter the night tide. It is high water, full, and change at 6h. 37m.; springs rise 8 feet.

General charts 943, 1263.

DIRECTIONS.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Guntuan or Eastern passage.—This narrow and tortuous passage, also called Ginatuan, is comprised between the north-east coast of Mindanao and the south points of the islands Dinagat and Bukas, passing north and east of Guntuan island, and north of Nangaba islets; although deep, it should not be taken by a sailing vessel without a pilot, on account of the strength of the currents and the tide-whirls met with off the south end of Dinagat. In case of necessity vessels can anchor at Surigao to wait a favourable wind and tide.

Pilots may be obtained and landed at Surigao and at Kantilan, which is a large village on the north-east coast of Mindanao, where supplies can be procured.

Tidal streams.—In Surigao strait the flood tide sets to the west, and the ebb to the east; the latter, following round Kautit point, then runs to the southward.

The velocity of the stream in the strait reaches a rate of 6 knots at springs. There is a difference of about 2 hours between the time of high water at Surigao and in Surigao strait (*see* page 419). Fishermen roughly estimate that when the moon rises the ebb tide commences to run in Surigao strait. From January to June there is but one high water during the twenty-four hours in Surigao strait, which occurs during the night. From July to December the same phenomenon takes place, but the time of high water is during the day.

From observations made by the Spanish surveyors, it appears that the highest tide on the west coasts of the islands of the strait takes place at the same hour as the lowest tide on the east coasts. This phenomenon is especially marked at the little island Kabsugan, south-west of Guntuan, the inhabitants of which live by shell-fishing; and when the banks of the east coast begin to cover they pass to the west coast, where the tide is falling, and continue their fishing.

Eddies.—Between Surigao (*Lat. 9° 47' N., Long. 125° 30' E.*) and Bilaa points a counter current prevails, contrary to the direction of the tidal stream in the strait, and between the coast of Mindanao and the islands Dinagat and Siargao a number of eddies prevail in different directions. The pilots of the locality avail themselves of these eddies in navigation.

Directions.—Having made Bilaa point a vessel can either pass outside the $2\frac{3}{4}$ -fathoms shoal north of the point, or between it and the point; and she should keep in mid-channel between Basol island and the coast of Mindanao. When one mile south of Basol the vessel should steer about S. 70° E. to pass one mile from the rocks that surround Rasa islet off the south point of Nonok island, south of

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Dinagat, but the Mindanao coast must be given a sufficient berth in passing it, and the reef with 3 fathoms on it lying N. 85° W. 2½ miles from Rasa lighthouse should be avoided; then, steering E.N.E., she should pass between Guntuan island and the east end of Nonok island, rather approaching the Nonok shore, which is steep-to and where she will be less exposed to the tidal streams and eddies, which are very violent in this passage. Guntuan island should be rounded at a distance of one mile, and when east of the eastern point of the island a course S. 32° E. should be steered for the middle of the channel between Bukas island and Amagadpagat islet, leaving the latter islet one mile to the southward; having passed through this channel, the vessel can steer eastward into the Pacific.

A steamer can pass between Guntuan and Bayatnan islands, taking care to avoid the reef off the north point of the last-named island, and passing northward of the islet which lies half a mile south of the southwest point of Guntuan. A course S. 47° E. will then lead to the middle of the channel between Bukas island and Amagadpagat islet.

Charts 2578, 2576, 2576.

MINDANAO ISLAND.—This island, next to Luzon, is the largest of the Philippines; it contains an area of about 36,292 square statute miles and a length of general shore line of about 1,383 miles. It has a very irregular shape, the coastline being much indented with deep bays and inlets. The large bays, Iligan on the north and Illana on the south, nearly sever the island in two, the isthmus between them being only about 7½ miles wide at the narrowest part, at the head of Port Misamis. The island is mountainous, and drained chiefly by two rivers, the Rio Grande de Mindanao, which enters the sea by an extensive delta at Kota Bato in the southern part of Illana bay, and which drains an extensive plain with several large lakes; and the River Agusan, the mouth of which is in Butuan bay on the north side of the island, though it rises near to the head of the Gulf of Davao, far to the southward. The volcano of Mount Apo (*Lat. 6° 59' N., Long. 125° 16' E.*), situated westward of Davao gulf, reaches an elevation of 9,662 feet, and is probably the highest point on the island and in the archipelago.

The whole island of Mindanao being less than ten degrees from the equator, its climate is hot and humid, and more equable than that of Luzon. It is under the influence of the monsoons of the northern hemisphere, and occasionally visited by typhoons. It has all the products of the other islands of the archipelago, and, in addition, cinnamon, nutmegs, pepper, and a great variety of timber. Gold dust is found in the sands of the rivers. It has a population of about 500,000, one-half of whom are classified as civilised.

General charts 943, 1263.

Charts 2578, 2575, 2576. Var. 1° 20' E.

At present Mindanao is divided into four provinces—Surigao, Agusan, Misamis, and the Moro province. Surigao and Misamis have the usual provincial form of government. Agusan is under the Special Provincial Government Act, with an appointed governor; it is divided into two sub-provinces, Butuan and Bukidnon, with the capital at Butuan. The Moro province includes the greater part of the island, the Sulu archipelago, and the Kagayan Sulu group. It has a special form of government, with a governor appointed by the Governor-General.

Communication.—Mindanao is connected with the general telegraph system by submarine cables to Negros, Sebu, Leite, Panay, and Manila; a cable is also laid between Samboanga and Sulu.

Chart 2578, E. part of Sulu or Mindoro sea.

North coast of Mindanao.—**Madilao point** (*Lat. 9° 47' N., Long. 125° 24' E.*), which lies about 3 miles south-westward from Bilaa point, the northern extremity of Mindanao (*see* page 418), is high, clean, steep-to, and composed of dark rock; no bottom was found at 92 fathoms at the distance of one cable from it. It forms, with Bilaa point, a bay about one mile deep, which offers anchorage sheltered from north-east to south-west through east.

The coast from Madilao point trends southward as far as the mouth of the Agusan river, and is little known, but appears to be safe and steep; it consists of the western slopes of two mountain ranges.

Butuan bay is about 19 miles wide between Tubay on the east and Diuata point on the west, and nearly 10 miles deep.

The eastern shore of the bay, from Mount Tubay, a conspicuous hill 1,475 feet high lying close to the shore, to the entrance to the mouth of the Agusan river, is low, densely wooded, and fringed by sand beaches.

The towns of Tubay and Kabadbaran, lying respectively $1\frac{1}{2}$ and $3\frac{1}{2}$ miles southward of Mount Tubay, are the only towns on the eastern shore of the bay. The country in rear of the coast between Kabadbaran and the entrance to the Agusan river is mostly wooded swamps with a succession of old and new river mouths. Shoal water extends from a quarter to half a mile from the eastern shore of the bay.

The southern shore of this bay, between the Agusan river, which enters the eastern angle, and the town of Nasipit, 10 miles to the westward, is low and heavily wooded to the sandy beach. Scattered houses and clearings exist on this stretch of coast, and the shore line is intersected by small unimportant streams. Shoal water does not

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

extend more than half a mile from the shore anywhere between these two points.

From Nasipit to Diuata point, about 10 miles to the north-west, the shore is fringed by a reef which varies in width from less than a quarter to half a mile.

Depths.—Butuan bay is reported to be very deep and free from danger; it has not been surveyed. The commander of the Spanish gunboat *Lezo* reported in 1891 that in the middle of the bay there is a shoal about a mile in extent, with 6 to 8 fathoms over it, and depths of 27 to 41 fathoms at the edge, but this report has never been verified.

Plan of Agusan river entrance on 957.

Agusan river (Lat. 9° 0' N., Long. 125° 31' E.), the second largest river in Mindanao, is supposed to take its rise not far north of Davao gulf, on the southern coast. Its entrance is divided into two channels by Pontod island, a small sandy cay with a settlement and cocoanut grove at its southern end. A shallow flat extends north-north-westward three-quarters of a mile, westward half a mile, and southward about a quarter of a mile from Pontod island; northward of the island the flat extends eastward to the shore across the northern entrance, which has been blocked by stones sunk for the purpose, and has a depth of only 3 feet at low water; it is not used for navigation.

Bar.—The western entrance has a width of about three-quarters of a cable at the narrowest part, and 8 feet may usually be carried over the bar at low water, and 11 or 12 feet at high water. The channel is generally marked by stakes maintained by the pilots, who move them if the bar shifts during heavy freshets. Inside, there are depths of from 20 to 27 feet at low water.

Landmark.—A white monument at the village of Baug, situated at the confluence of the Agusan and Baug rivers, is said to mark the spot where Magellan celebrated the first mass in the Philippines; it forms a good landmark.

Leading beacons.—Lights.—Two concrete beacons, on which are exhibited *red fixed* lights, visible about 7 miles, are situated on the northern side of the entrance to the Agusan river. These beacons in line, bearing S. 84° E., lead in the best water across the bar.

The front beacon, immediately south of the white monument, is surmounted, at a height of 14 feet above the sea, by a white triangular daymark, point up, with a black vertical stripe through the centre; the rear beacon is surmounted, at a height of 22 feet above the sea, by a similar daymark, point down.

Pilots.—The pilot station is at the south end of Pontod island, and strangers are advised to employ them.

General charts 2578, 943, 1263.

Plan of Agusan river entrance on 957. Var. 1° 20' E.

Anchorage.—There is no good anchorage outside the entrance, the water being deep and the bar steep-to. Good anchorage for small vessels that do not intend to ascend the river may be found at the mouth of the Baug river, which enters the Agusan just inside the bar. During the rainy season, which begins in December and lasts about four months, the river is very high and filled with floating debris, most of which can be avoided by anchoring under the lee of a point.

Directions.—To enter, bring the leading beacons in line and steer for them, keeping a good look-out for shoal water on either side. The shoal extending about a quarter of a mile southward from the south side of Pontod island is composed of hard gravel. When within about $1\frac{1}{4}$ cables of the front beacon, haul to the southward, keeping towards the eastern side of the channel until about a quarter of a mile past the entrance of the Baug river, when keep in mid-stream.

Tides.—Only one high water generally occurs during the 24 hours, and this by day or night according to the season.

Chart 2578, E. part of Sulu or Mindoro sea.

Butuan town (Lat. $8^{\circ} 56' N.$, Long. $125^{\circ} 32' E.$), the capital of Agusan province, is situated on the left bank of the River Agusan, about 5 miles from the sea. There is a small bamboo wharf, alongside which vessels may lie by using off-shore moorings. Butuan carries on a considerable trade in hemp and copra, principally with Sebu.

Vessels should anchor below the wharf, as the river higher up is contracted by a shoal extending from the west bank. The anchorage is frequented by traders from Port Misamis and from Sebu, and there is a depth of $2\frac{1}{2}$ to 5 fathoms between the bar of the river and the town; vessels should keep in mid-stream.

Supplies of cattle, pigs, poultry, rice, and sago are obtainable.

Plan of Nasipit harbour on 957.

Nasipit harbour is formed by an opening between bluff rocky headlands about 4 cables apart, and extends about one mile southward. Both entrance points are fringed with reefs, which show plainly on a clear day; that on the western side extends 3 cables northward from the point. The reef on the eastern side extends westward $1\frac{3}{4}$ cables, and continues much further in than that on the western side, which is narrower. The bluffs forming the entrance and the cocoanut groves are good landmarks for making the harbour.

The outer harbour is an excellent one for moderate-sized vessels, having depths of from 6 to 10 fathoms over an anchorage area about three-quarters of a mile long by about $1\frac{1}{2}$ cables wide. The inner harbour is contracted by shoal water, and is only practicable for small

General charts 2578, 943, 1263.

Plan of Nasipit harbour on 957. Var. 1° 20' E.

craft; in it there is an anchorage area of about 150 yards in diameter, where there is a depth of 2 to $3\frac{1}{2}$ fathoms.

The town of Nasipit lies on the bluff forming the eastern entrance point. A large quantity of copra is produced here.

Directions.—To enter the outer harbour a mid-channel course should be steered to avoid the reefs making out from either side, steering for the western tangent of the high island separating the two harbours on a S. 16° W. bearing, and anchoring anywhere in mid-channel. Small craft entering the inner harbour should hug the low point on the starboard hand, as it is steep-to.

There are no aids to navigation, and caution is necessary.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Diyata point, the western entrance point of Butuan bay, is low densely wooded, formed entirely of coral, with coral sand beaches, and fringed by a reef, which commences about Nasipit and extends out less than a quarter of a mile from the point, continuing round it to the westward.

Gingoog bay, westward of Diyata point, is about 15 miles wide, and extends a considerable distance southward. The bay has not been surveyed, but is believed to be deep and clear. The villages of Odiungan and Gingoog lie near the head of the bay.

The town of Talisayan is situated in the western part of the bay near the mouth of a river. Anchorage close to the shore and exposed to north-east winds may be had here in 20 fathoms, with the town bearing S. 1° E. Inshore of this position the water shoals rapidly.

Sipaka point (*Lat. 9° 1' N., Long. 124° 55' E.*), the western entrance point of Gingoog bay, can easily be recognised by a conical hill of good height, thinly wooded, and by Kanauayor islet, lying westward of it. The shore of the point is clean and steep-to, with a depth of 55 fathoms very near it.

Kanauayor islet is small, about 82 feet high, and shown on the chart as lying about one mile west-north-west of the north-west shoulder of Sipaka point; the channel between the point and the islet is foul. South of the islet there are some warehouses on the shore, and there is an opening between the reefs affording a small anchorage sheltered by the islet and Sipaka point; this anchorage is entered from the north-westward. The centre of this islet and the conical hill on Sipaka point are stated to be in line, N. 81° E. true, instead of as shown on the chart.

Bagakay point, about 6 miles westward of Sipaka point, is not very high, and is fringed by a reef about 2 cables wide, with a

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

depth of 5 fathoms near it. It is reported that the reef off Bagakay extends much farther northward than is charted. The coast between Sipaka and Bagakay points is formed by sandy beaches alternately with rocky bluffs and mangrove shores.

The channel between Bagakay point and Kamiguin island, about 5 miles wide, is clear.

Kamiguin island, lying $5\frac{1}{2}$ miles to the north of Bagakay point in Mindanao, is about 12 miles long, north-west and south-east, and 8 miles wide, east and west; it is extremely mountainous and steep, rising to a central peak elevated 5,338 feet above the sea. On the north-west part, $2\frac{1}{2}$ miles east of the village and anchorage of Katarman, rises a double peak 4,795 feet high. The island produces rice, good tobacco, wax, and cacao in abundance. The population amounted to 30,754 in 1903.

There are some anchorages off it, only sheltered in certain winds, and not very safe. The *Challenger* anchored north-west of the town of Agajo in a depth of 6 fathoms, with the north point of Kamiguin bearing N. 78° E., the north-west point S. 50° W., and the sandy cay north-west of the island N. 40° W.

Both Agajo and Manbahao have reefs off them. Medano islet, the sand cay above mentioned, lies three-quarters of a mile north-west of the town of Agajo; it is about 3 cables in extent and 6 feet above the sea at high water springs, and has bushes on it.

Manbahao, the principal town on the island, is situated on the northern coast. A wide reef fringes the shore in front of the town. There is a small wharf in a break in this reef.

LIGHT* (*Lat. 9° 16' N., Long. 124° 43' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 32 feet above high water, from a pole on the end of the wharf at Manbahao.

Anchorage.—Vessels anchor in 15 fathoms, with the wharf bearing S.S.W.; small vessels anchor closer in, in 11 fathoms, with the wharf on the same bearing, and Medano islet, the small sandy cay north-west of Agajo, just open of a small single tree on the extremity of the point westward of Manbahao.

Shoal.—A rocky shoal three-quarters of a mile long lies east $2\frac{1}{2}$ miles from Manbahao point, the northern extreme of the island.

Coast.—From Manbahao point the coast of Kamiguin island is rocky as far as Mahinogo, a small village on the east coast, off which there is anchorage in a depth of 9 fathoms, sand. The south-eastern point of the island has some sand patches off it. Farol point, the

* In December, 1910, the wharf from which the light was exhibited was destroyed by a typhoon. A new light will be established.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

southern extreme, is surrounded by rocks. The town of Sagay, off which there is anchorage in $5\frac{1}{2}$ fathoms, lies 2 miles north-west from the south point.

On the west side of the island there is anchorage in 14 fathoms off Katarman, a village between two low points; and also in the bight southward of the point which forms the limit of Katarman bay. The double peak east of Katarman serves as a guide to it.

The town of Katarman was destroyed in 1871. The following is a description taken from the report of the *Challenger*, which visited the island in January, 1875: "The volcano at Kamiguin island burst forth in July, 1871, from some low land on the west side of the island, and in two months had thrown up a hill two-thirds of a mile long, one-third of a mile wide, and about 450 feet high, destroying the whole vegetation for miles round, as also the flourishing village of Katarman on the western shore. The volcano had at the time of the visit attained a height of 1,950 feet, and was still in vigour, as denoted by the column of smoke seen by day and the series of small fires visible at its summit by night. Nearly all the inhabitants of Kamiguin, the population of which formerly amounted to 11,000, had left the island in consequence of the outburst."

Bantiki islet, which lies nearly 4 miles off the east coast of Kamiguin, is surrounded by rocks extending to the distance of half a mile, except on the southern side, where it can be approached and anchorage found in a depth of $2\frac{3}{4}$ fathoms, sand.

Tidal stream.—The flood stream entering through Surigao strait passes to the south-west on both sides of Kamiguin island with great force, but loses its strength as it enters Makahalar bay on the coast of Mindanao.

Coast of Mindanao.—Gorda point (*Lat. 8° 43' N., Long. 124° 45' E.*).—From Bagakay point the coast trends to the southward, forming a slight indentation with four towns on it; at a distance of 17 miles lies Gorda point, which is bold with a flat crown, wooded, and steep-to. Balingasag bay, between Gorda point to the south and Banbayan point to the north, is $2\frac{1}{2}$ miles wide and one mile deep; there is anchorage in front of the town of Balingasag at the distance of 2 cables from the shore, in a depth of 9 fathoms, sand and rock.

Dangers.—A shoal, with a depth of about 3 fathoms, is situated $4\frac{1}{4}$ miles S. 8° W. from Bagakay point; it appeared to be about a cable long and half a cable broad. Its position is doubtful.

Constancia rock is charted about a mile north-north-west of Banbayan point, but its position is not well known. A late report says that

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

it is a small coral reef, about 2 cables in diameter, lying about one mile from the shore. Depths of 4 to 12 feet were found on the reef and 20 fathoms around it. From the reef Banbayan point bore S. 27° E. and Gorda point S. 8° W. The channel between it and the point is clear.

Alutaya shoal, lying S.W. by W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from Gorda point, is of oval form, with a greater diameter of one mile; at low water the centre uncovers, leaving dry a bank of sand and rocks. In the channel between it and the coast the depth exceeds 40 fathoms.

MAKAHALAR BAY is an extensive bay, open to the north-west, situated between Gorda and Sulauang points. The eastern shore of the bay is steeper and higher than the western, and is formed of sandy beaches separated by a low headland. The western shore is clear and steep, but from Malugan point a reef extends north-eastward to the distance of $7\frac{1}{2}$ cables. The centre of the bay is deep, but has not been sounded out.

Hasaan is a small town 5 miles south of Gorda point; in the elbow north of the town, called Kabulig bay, there is anchorage well sheltered in both monsoons, but close to the shore, in a depth of 13 fathoms, muddy sand. The town of Tagoloan is situated 5 miles south of Hasaan.

Plan of Kagayan anchorage on 957.

Makabalan point (Lat. $8^{\circ} 31' N.$, Long. $124^{\circ} 40' E.$), on the south shore of Makahalar bay, is marked by a few nipa houses and a small grove of cocoanut trees. At $1\frac{3}{4}$ cables southward of the point there is a small wharf with a few warehouses and some native houses near it. This is the landing place for the town of Kagayan, with which it is connected by road.

LIGHT.—A red fixed light, visible 9 miles in clear weather, is exhibited, at an elevation of 58 feet above high water, from a white, steel framed tower, 53 feet high, on Makabalan point. For arc of visibility, see Light list.

Kagayan anchorage.—Vessels not intending to go to the wharf can find anchorage in 18 to 30 fathoms, soft mud, with the wharf bearing about N.W. by N., distant $1\frac{1}{4}$ cables. In approaching this anchorage, to give the shoal water off Makabalan point a good berth the village of Gusan, on the south shore, should be kept bearing nothing eastward of S. 2° E. until the wharf bears S. 66° W., when it may be steered for. Steamers can anchor alongside the wharf.

Buoy.—A red conical buoy in 3 fathoms, sand and mud bottom, northward of Makabalan point marks the shoal making off between

General charts 2578, 943, 1263.

Plan of Kagayan anchorage on 957. Var. 1° 20' E.

that point and Kagayan river. The river mouth bears W. by S. $1\frac{1}{4}$ miles from the buoy. Vessels should pass well eastward of this buoy when entering Kagayan anchorage.

Telegraph cable.—From Makabalan point a submarine cable is laid to Iligan, whence connection is made with the general telegraphic system (*see* pages 439, 440). There is a telegraph station at Kagayan anchorage.

Chart 2578, E. part of Sulu or Mindoro sea.

Kagayan river, which enters at the head of Makahalar bay, has about one fathom on the bar at low water; but the depth and direction are constantly changing with the freshets of the rainy season. At present the channel trends about S. by E., and the entrance is marked by two stakes. A vessel drawing $7\frac{1}{2}$ feet can enter at high water and proceed to the town of Kagayan, above which it is not navigable, being filled with rocks. Shoal water extends about $1\frac{1}{2}$ miles from the mouth of the river. The river pours out a considerable quantity of water at the rate of 2 knots an hour at ordinary times.

The town of Kagayan, the capital of Misamis province, with a population of about 7,100, lies $2\frac{1}{2}$ miles up the river, and about the same distance south-westward from the wharf. A fair amount of trade is carried on, and gold is found by washing in the mountains.

Anchorage.—At half a mile northward of the mouth of the river there is a bank of sand covered by a depth of from 3 to 11 fathoms, where anchorage may be had sheltered from all winds except those from north to west. Vessels can also anchor off Makabalan point in 22 fathoms.

Opol bay is 5 miles westward of the mouth of Kagayan river; there is anchorage in front of the town in a depth of 12 fathoms, near a sandbank. A steep reef fringes the coast to a distance of one cable near Opol, and extends $7\frac{1}{2}$ cables north-eastward from Malugan point.

Alubihit anchorage is 7 miles north-west of Opol, and south of Sulauang point, where the coast forms an elbow fringed by a reef to the distance of $2\frac{1}{2}$ cables. The anchorage is north-east of the village in a depth of 17 fathoms, and to the north of some houses on the beach.

Sulauang point (*Lat. 8° 38' N., Long. 124° 29' E.*), the most northern point in this vicinity, is of uniform height, covered by mangroves; rocky ledges, surrounded by deep water, stretch out to nearly one mile from it.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Coast.—The coast from Sulauang point curves around in a south-westerly direction for about 12 miles to Initao point, the eastern entrance point of Iligan bay. Maputi point, 3 miles south-south-westward from Initao point, is broad and rugged; between the two the coast recedes, forming Initao bay, where there is anchorage for small vessels in 3 fathoms in front of the town of Initao.

ILIGAN BAY.—Between Initao point to the east, and Polo point to the west, is a great arm of the sea, about 34 miles across and 24 miles deep, open to the north; its shores are in general safe and steep-to.

Kiualan (Kinalang) anchorage, in a small bay about 12 miles southward from Maputi point, offers good anchorage in its north-eastern part, in 20 to 25 fathoms, sheltered from the eastward, about $1\frac{1}{2}$ cables from the edge of the shore reef. Good water can be obtained from a river which discharges just eastward of the south point of the bay.

Iligan.—The town of Iligan, of 5,300 inhabitants, is situated in the south-east angle of the bay, in a fertile plain on the bank of the river of the same name. There is a stone mole immediately north of the mouth of the river, on both sides of which are reefs, dry at low water. The river is small and unimportant, having only about 3 feet on its bar at low water. The anchorage off Iligan is bad, as very deep water is found close to the reefs. Iligan is a telegraph station.

Tides.—It is high water, full and change, at Iligan, at 10h. 55m.; springs rise $4\frac{1}{2}$ feet.

Telegraph.—A land wire runs from Iligan to Lintogo, a telegraph station, which is also connected, viâ Illana bay and Samboanga, with Sulu. A cable from Kagayan is landed on the north side of the mole at Iligan.

Camp Overton (*Lat. 8° 13' N., Long. 124° 12' E.*) is a military post situated about 2 miles south-westward of Iligan. There is a wooden wharf, over 1,000 feet long with 28 feet of water at its end, built out from a break in the reef. In going alongside this wharf great care is necessary, as rocks are reported to exist a short distance from either side of it.

Light.—A *red fixed* light, visible 7 miles in clear weather, is exhibited, at an elevation of 110 feet above high water, from a white frame structure, 14 feet high, on Hospital hill, Camp Overton.

Anchorage, protected during the south-west monsoon, but very close in on account of the great depth of water, may be found here. Both Overton and Iligan anchorages are bad, the depths being from

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

20 to 30 fathoms, and at times during the north-east monsoon are untenable; at such times vessels seek shelter in Kiualan anchorage.

Directions.—Vessels bound for Camp Overton should bring the end of the wharf to bear S. 28° E. and steer for it, anchoring in 28 or 30 fathoms with sufficient swinging room to clear the wharf.

Telegraph cable.—A cable from Misamis is landed about 4 cables eastward from the wharf, and a cable from Dumaguete in Negros island is landed between Camp Overton and Iligan.

Coast.—From Camp Overton the coast trends westward with a slight curve southward for about 11 miles to Binuni point, and is intersected by several small rivers.

The Agus river, which discharges about 1½ miles westward from Camp Overton, is the outlet of Lake Lanao. It is a rapid flowing river, descending about 2,200 feet in a distance of about 21 miles, has a depth of 4 feet on the bar at low water, and is somewhat deeper for a short distance up.

From Overton to the Agus river a coral reef extends about a quarter of a mile from the shore: thence to the Ridapon river, about 3 miles westward, there is very little reef. Near the Ridapon river the reef begins again, and continues to Binuni point with a general width of nearly half a mile.

Along this stretch of coast heavily wooded hills rise a short distance inland.

Plan 3426, Port Misamis.

Binuni point is low, wooded, and surrounded by a fringing coral reef to a distance of half a mile. From here the coast trends west-south-westward towards Port Misamis.

PORT MISAMIS, including Panguil bay, is a long, narrow inlet extending in a south-west direction for about 22 miles. It is 9 miles wide at the entrance between Binuni and Lokulan points, and narrows until about 12 miles from the entrance, where it is less than one mile wide. From this point it spreads out, forming a large shoal basin known as Panguil bay. The shores of the port are low, and covered with mangroves, but northward from Misamis town there is an extended sandy shore, and immediately southward on the opposite coast there are high hills. A number of reefs and shoals render the approach to Port Misamis somewhat dangerous, and the entrance should be cautiously approached; the position of the buoys is not to be depended on.

Depths.—At the entrance of Port Misamis on the line between Binuni and Lokulan points, the depth is over 100 fathoms, but at a

General charts 2578, 943, 1263.

Plan 3426, Port Misamis. Var. 1° 30' E.

short distance southward the soundings commence and decrease quickly, until, at $1\frac{1}{2}$ miles southward of the entrance, in the channel between Narvaez and Lokulan shoals, the depths are 16 to 19 fathoms, mud; thence they decrease to $5\frac{1}{2}$ fathoms abreast Pasil shoal buoy, and vary between that depth and 12 fathoms, with a bottom of fine sand, until abreast Misamis. Between Misamis and Panguil bay, the navigable channel has a general depth of from 4 to 6 fathoms, mud, with a few patches of $2\frac{1}{2}$ to 3 fathoms, as far as Solatan island, where the channel is 4 cables wide. Here the depth increases to 10 fathoms for a short distance, and then for about 3 miles the depth is 3 to 4 fathoms until within Panguil bay, where it is less than one fathom over the greater part.

Lokulan point (*Lat. 8° 12' N., Long. 123° 52' E.*), the western entrance point of Port Misamis, is low and sandy. The village of Lokulan lies behind the point on a river of the same name; it is small and nearly concealed by trees. Anchorage may be found eastward of the point in 6 fathoms, sand.

Opol point lies $2\frac{1}{2}$ miles southward of Lokulan point.

The fort at Misamis is situated about a quarter of a mile south-east of the town, on Misamis point, and is conspicuous.

DANGERS.—South-eastern side.—Narvaez shoal, the outer danger on the south-eastern side of the eastern approach to Port Misamis, is a patch of coral covered by a least depth of $1\frac{3}{4}$ fathoms, lying $1\frac{1}{2}$ miles from the south-east shore of the port, and nearly 5 miles east-north-eastward from Misamis fort.

Panguilinan shoals are two small patches of $1\frac{3}{4}$ fathoms, lying about $1\frac{1}{4}$ miles south-west of Narvaez shoal and $1\frac{1}{2}$ miles off-shore.

Kulasejang shoal, with $1\frac{1}{2}$ fathoms least water, lies east-south-eastward of Panguilinan shoals, nearly midway between them and the shore.

Pasil shoal is a long, narrow shoal, extending nearly 3 miles in a north-east direction from Palalagoya point on the south side of the port. It has depths varying from one-quarter to 3 fathoms over it, and from the northern edge of the 3-fathoms curve the fort at Misamis bears W. $\frac{3}{4}$ S., distant nearly 2 miles.

Buoy.—A black can buoy, No. 1, is moored off the northern end of the shoal in 5 fathoms, hard sand, about 7 cables northward of the 3-fathoms edge.

North-western side.—Lokulan shoals, lying from a half to $1\frac{1}{4}$ miles from the shore, about midway between Lokulan and Opol points, consist of sand and rock, parts of which dry at low water.

General charts 2578, 943, 1263.

Plan 3426, Port Misamis. Var. 1° 30' E.

Trunks of large trees, stranded by the currents, may often be seen on the shoals.

Buoy.—Three shoal spots, with depths of from 3 feet to 2 fathoms, lie half a mile east-south-eastward of Lokulan shoals, with a deep channel between them. The southernmost of these patches is marked on its eastern side by a red conical buoy, No. 2, moored in 2 fathoms, coral, north-eastward $3\frac{1}{2}$ miles from the fort at Misamis.

Shoal water extends nearly one mile eastward and north-eastward from the fort at Misamis, and at a quarter of a mile beyond this is a shoal spot with $2\frac{1}{2}$ to 3 fathoms on it.

Buoy.—The south-eastern edge of the above-mentioned shoal spot is marked by a red conical buoy, No. 4, moored in 4 fathoms, hard sand, E. by N. $\frac{1}{2}$ N., about $1\frac{1}{4}$ miles from the fort. This is the narrowest part of the channel, the width being about 4 cables.

Clearing mark.—Lokulan point, just open of the land northward of Opol point, leads eastward of the spot of $2\frac{1}{2}$ fathoms.

Anchorage (*Lat. 8° 8' N., Long. 123° 50' E.*).—There is an anchorage off Misamis in from 4 to 10 fathoms. Good anchorage may be found south-westward from the fort, according to draught. A good berth for a large vessel is in $4\frac{1}{2}$ fathoms with the fort bearing N.E. by N., distant a quarter of a mile; small vessels may anchor further northward, about one cable southward of the wharf.

Directions.—There are two channels leading into Port Misamis, of which the eastern channel is the wider and better, and is the one generally used. Vessels from the eastward should bring the fort at Misamis to bear S. 58° W. when at least 6 miles distant, and steer for it; this course should give the red buoy of the Lokulan shoals and the black buoy off the northern extreme of Pasil shoal each a berth of about 3 cables. In certain lights it is difficult to distinguish the fort at this distance, in which case the vessel should be kept at least 2 miles off the southern shore until the fort or the red buoy of the Lokulan shoals is made out. When Pasil shoal buoy is abeam and Lokulan point bears N. 15° W., alter course to S. 29° W.; when the fort bears S. 72° W. and Lokulan point N. 6° W. steer S. 48° W., passing about $1\frac{1}{4}$ cables eastward of the red buoy marking the shoal water eastward of the fort, and when the fort is abeam the vessel may be hauled in for the anchorage.

Vessels entering by the northern channel should pass about half a mile eastward of Lokulan point and steer S. 1° W., keeping a good lookout for the shoals on either side. This course should take a vessel about a cable westward of Lokulan shoals, the western limit of which is usually marked by a stake, but its presence must not be relied on.

General charts 2578, 943, 1263.

Plan 3426, Port Misamis. Var. 1° 30' E.

The channel between Lokulan shoals and the shore bank is about a quarter of a mile wide, with a depth of 9 fathoms. When the fort bears S. 72° W., alter course to S. 48° W., and proceed as before directed. The least depth passed over on the above courses is 5 fathoms.

Misamis (*Lat. 8° 9' N., Long. 123° 51' E.*).—The town of Misamis, with a population of about 5,500, lies on the northern shore of the port, 1½ miles south-westward of Opol point. It is a telegraph station.

Tides and tidal streams.—It is high water, full and change, at Misamis at 11h. 32m.; springs rise 4½ feet. The tidal streams follow the direction of the channel, flood setting south-west and ebb north-east with a velocity of 3 to 4 knots an hour.

Telegraph cable.—The cable from Camp Overton is landed near the fort at Misamis. *See page 440.*

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Coast.—Near the shore on the western side of Iligan bay the land is low, flat, and swampy, and interspersed with low-lying alluvial and sandy areas. At a distance of one to 2 miles back from the coastline the foot hills begin to rise gradually to the mountain range running parallel to the shore. The foot hills, for a distance of from 6 to 10 miles from the shore, are cultivated, about one-half the area being cleared; on the uncleared portion are many large trees. The mountains are much broken and heavily wooded, and the peaks seemingly very steep; the valleys are precipitous. The shore is generally fringed with coral, which in some places extends to a distance of 1½ miles.

Balikako point, 1½ miles northward of Lokulan point, is a rounded sandy point, fringed with cocoanut trees. There are several detached reefs off this point, which should not be approached within one mile.

From Balikako point the coast trends northward with a curve westward for 5½ miles to Tabu point, forming a large bay with a low shore of sand and mangroves, fringed in most places with coral. There are three villages along this part of the coast.

Reefs.—A chain of reefs, parts of which dry at low water, begins about half a mile north-eastward of Balikako point, and extends northward to within one mile of Tabu point. The outer edges of these reefs, which are steep-to, lie over 1½ miles from the shore.

Anchorage.—Between these reefs and the land there is an expanse of water where anchorage, well sheltered from the sea during the north-east monsoon, may be found in depths of from 3 to

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

20 fathoms, mud and sand. Tudela anchorage has depths of 6 to 12 fathoms.

Access to this anchorage may be had through channels between the reefs lying eastward of it or from the northward, care being taken to avoid a $1\frac{1}{2}$ -fathoms patch lying in the middle of the northern entrance, one mile S. 6° W. from Tabu point.

Tabu point (*Lat. 8° 20' N., Long. 123° 51' E.*), about $7\frac{1}{2}$ miles northward of Lokulan point, is a low, sharp, sandy point, bordered by cocoanut trees. It is very steep-to, a depth of 4 fathoms being found within 50 yards of it.

Jimenez.—The town of Jimenez, with a population of about 7,000, lies $1\frac{1}{2}$ miles north-westward of Tabu point, and half a mile from the shore; it is easily recognised by a prominent stone church with square tower and hemispherical dome, situated well back among the trees. The landing place is at the termination of the main street leading to the town, northward of a black iron warehouse.

There is regular steam communication with Sebu.

The shore in this vicinity is faced by a number of reefs, parts of which are awash at low water, and are usually well defined and easy to pick up. Between these reefs and the shore there is good but contracted anchorage. Between the reefs there are a number of channels leading to the anchorage, but the southern one is generally used. There are no aids to navigation, and a stranger entering for the first time should exercise great caution, and keep a good lookout for reefs on either side.

The Palilan river, with very little water on the bar at low water, discharges about 3 cables northward of the landing place.

Directions.—To approach the anchorage off Jimenez by the southern channel, when about one mile off Tabu point bring the church to bear N. 58° W. and steer for it; when Tabu point bears N. 22° W. haul northward, and pass from a half to three-quarters of a cable eastward from the point. Having passed Tabu point, keep a little to the westward, and anchor off the prolongation of the main street leading to the town in from 4 to 6 fathoms at 2 cables from the shore.

The anchorage may also be approached from the north-eastward, but this channel is seldom used. To enter, steer for the church on a S. 54° W. bearing, and when Tabu point bears S. 21° E. steer for it, and anchor as previously directed. There is also anchorage within the reefs in from 9 to 12 fathoms.

Coast.—From Tabu point the coast trends in a general N. 16° W. direction for $6\frac{1}{2}$ miles to Balaring point. The first $2\frac{1}{2}$ miles is faced by detached reefs to a distance of about one mile; thence to Balaring

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

point the reefs which fringe the shore do not extend off more than half a mile, and there are no off-lying dangers. Mapaan point, about $3\frac{1}{2}$ miles northward of Tabu point, is low, sandy, covered with cocoanut trees and fringed by reefs to a distance of 4 cables.

Aloran, a village situated about 5 miles northward of Jimenez and one mile from the shore, is not visible from seaward. The landing place is marked by an iron-roofed warehouse and several nipa houses.

Anchorage, for communicating with Aloran, may be found in about 16 fathoms off the edge of the shore reef, with the warehouse bearing W.S.W., distant about 4 cables.

Balaring point is round, sandy, and bordered with mangroves and nipa, with a strip of cocoanut trees behind at about half a cable from the shore; it is fringed with reefs to a distance of about a quarter of a mile.

From the point the coast trends north-westward for 3 miles to Simio point, which is low, sandy, covered with cocoanut trees, and surrounded by reefs which extend nearly a quarter of a mile off.

The village of San Vicente lies about $1\frac{1}{4}$ miles south-westward of Simio point and two-thirds of a mile inland; it is not visible from seaward, being concealed by trees.

Anchorage for San Vicente may be found in 4 fathoms, about 4 cables southward from some houses on the beach, just northward of the mouth of the San Vicente river.

Oroquieta (*Lat. 8° 29' N., Long. 123° 48' E.*), the largest and most important town on the shores of Iligan bay, lies about one mile north-west of Simio point on the left bank, and at the mouth of the Oroquieta river. In 1903, it had, with dependent villages, a population of about 15,000. It is readily distinguished by a large warehouse, visible at a considerable distance from the northward, and also by the church which stands close to the beach. The Oroquieta river has about $1\frac{1}{2}$ feet of water on its bar at low water. There is regular steam communication with Sebu.

Anchorage, protected from southerly and westerly winds, with good holding ground, may be found about a quarter of a mile from the shore in 12 fathoms, with the church bearing S.W. The anchorage should be cautiously approached as the bank is very steep. At times, during the north-east monsoon, this anchorage becomes untenable, and small steamers find anchorage in Lobok cove, about one mile north-westward from Oroquieta, in from 6 to 7 fathoms; this anchorage is very contracted, and vessels are obliged to moor head and stern, but it affords shelter in all but the heaviest weather.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Paypayan bay, between Napolo and Layaban points, 2 and $2\frac{1}{2}$ miles, respectively, north-westward from Oroquieta, is fringed by a wide reef, leaving anchorage space at the entrance nearly a quarter of a mile in extent, with a depth of $3\frac{1}{2}$ fathoms in the middle, south-eastward of Layaban point.

Layaban point is a low sandy point, bordered by cocoanut trees that grow so closely together that the point has the appearance of a high bluff when seen from a distance. The reef, which fringes Paypayan bay, surrounds Layaban point, continues northward to Silanga island, and has a general width of about half a mile.

Silanga island, lying on the reef close to the shore, about $2\frac{1}{2}$ miles northward from Layaban point, is small and covered with trees, about 60 feet high. The reef extends about 4 cables eastward from the island.

Polo bay.—From Silanga island the coast trends north-westward, then northward and then eastward to Polo point, which bears N. 21° W., distant $2\frac{3}{4}$ miles from Silanga island, forming Polo bay. This large bay is almost filled with reefs, in which are two breaks where sheltered anchorage in from 7 to 8 fathoms may be found. The better anchorage of the two is about one mile southward from Polo point lighthouse. A stranger should not attempt to enter them except at low water, when the edges of the reefs can be distinguished. There are no aids to navigation. The light on Polo point is obscured over these reefs.

Kapayas islet is very small, and composed of coral rock; it lies S. 25° E., $1\frac{1}{2}$ miles from Polo point lighthouse. In 1906 it had two native houses and some bushes about 5 feet high on it; the greater part of the islet was cultivated with tobacco.

Polo point, the north-eastern extremity of the coast in this vicinity, is low, and the land is flat for some distance within it, being a mangrove swamp with a passage through it for small boats to Port Langaran, Inamukan bay. Polo point is fringed by a narrow steep-to reef, and depths of over 50 fathoms are found at less than half a mile from it.

LIGHT (*Lat. $8^\circ 36'$ N., Long. $123^\circ 45'$ E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 60 feet above high water, from a white steel framed tower on Polo point. For arc of visibility, see Light list. A small concrete dwelling stands at the base and to the east of the tower.

Iligan reef.—About $7\frac{1}{2}$ miles N. 62° E. of Polo point there is a dangerous shoal of coral and white sand, with a least depth of $1\frac{1}{2}$ fathoms on it; the bank is circular in shape, about 4 cables in extent, and steep-to. Its exact position is a little uncertain.

General charts 943, 1263.

Plan of Port Langaran on 3426. Var. 1° 30' E.

Port Langaran (Inamukan), about $1\frac{1}{2}$ miles west of Polo point, is the harbour for the town of Langaran, standing on the coast about $1\frac{1}{2}$ miles north-west of the port. It is small, but affords good protection during south-west winds, and fair shelter in north-east weather, on account of the reefs extending from both entrance points; the space, however, is very limited, with depths of from 6 to 12 fathoms. Reefs extend about a cable off Baubaon point on the east and $2\frac{1}{2}$ cables off Inamukan point on the west side of the entrance, leaving a channel between them nearly $1\frac{1}{2}$ cables wide, with a depth of 14 fathoms; the south-eastern portion of the harbour is filled with reefs, steep-to. The best anchorage is about a cable from the western shore in from 6 to 8 fathoms, mud.

Directions.—To enter, steer in on a S.S.W. course, giving Baubaon point, the eastern entrance point, a berth of about $1\frac{1}{2}$ cables, and when the buildings on the western side of the port bear about W. by S. steer towards them and anchor about a cable off the western shore.

Chart 2578, E. part of Sulu or Mindoro sea.

Langaran.—This town is situated on the coast about 3 miles westward of Polo point, and has several conspicuous buildings.

Langaran shoal, with a least depth of 2 fathoms, lies half a mile north-east of Langaran, and Usucan shoal, with a least depth of $1\frac{1}{2}$ fathoms, lies about $1\frac{1}{2}$ miles north-westward of Langaran. The light on Polo point is obscured over these shoals, but the line of obscuration passes close to their northern edge.

Anchorage can be taken up off the town of Langaran in 5 to 10 fathoms one-third of a mile from the shore, care being taken to avoid the two shoals just mentioned. When standing in for this anchorage, the church steered for on a S. 2° E. bearing leads between the two shoals.

Plan 3407, Murcielagos bay.

Bombon point (*Lat. 8° 41' N., Long. 123° 37' E.*), 9 miles west-north-westward from Polo point, is low, clean, and steep-to.

Murcielagos bay.—At about $1\frac{1}{2}$ miles westward of Bombon point the shore recedes southward, and forms a large bay about 3 miles deep and 6 miles wide between Bulato point on the east and Silla point on the west. It is nearly blocked up with reefs and islets, among which there are narrow channels where a small vessel could find sheltered anchorage. On the western side of the bay a passage $1\frac{1}{2}$ cables wide, and with depths of from 5 to 20 fathoms, named the Talukluk channel, leads to anchorage in about 16 fathoms, eastward and southward of Talukluk islet. In the south-east part of the bay an inlet, named Kasul bay, from one mile to half a mile in width, penetrates

General charts 2578, 943, 1263.

Plan 3407, Murcielagos bay. Var. 1° 30' E.

2½ miles southward. It is approached by a channel half a cable wide, with a depth of 3¾ fathoms, southward of which there is a considerable area in which the depth is 6 fathoms, but with a reef in the centre of it. Southward of this the water shoals gradually to the head of the inlet, one mile from which there is a rock awash.

The only settlements in the bay are the villages of Baliangao in the north-east and Libai in the south-west.

Silla point, the western entrance point of Murcielagos bay, is surrounded by a reef less than a quarter of a mile wide. It may be recognised by Mount Silla, 1,010 feet high, which rises immediately behind it. Mount Silla is almost bare rock, very sharp, and shaped like a thumb. It, with the adjacent hills, takes the shape of a saddle when viewed from the north-eastward.

Plan of Dapitan bay on 957.

Tagolo point (Lat. 8° 44' N., Long. 123° 22' E.), the most northern point of land in this vicinity, lies about 8 miles westward of Silla point. It is not very high, and is surrounded by a narrow reef, but at the distance of one cable from it no bottom was found at a depth of 36 fathoms. Between Silla and Tagolo points there is an intermediate point, Baloi, which is high, rocky, and rugged, its peaks showing most fantastic outlines. The shore eastward of this point is low, and covered with mangroves, with rocks off it; but to the westward the shore is high and steep.

LIGHT.—From a white concrete house on Tagolo point is exhibited, at an elevation of 109 feet above high water, a *white occulting light every ten seconds*, thus:—light, *seven seconds*; eclipse, *three seconds*, and visible 15 miles in clear weather. For arc of visibility, see Light list.

Tidal streams.—The tidal streams are very strong off this part of the coast. The flood makes to the east, and the ebb to the west.

Chart 2578, E. part of Sulu or Mindoro sea.

Silino island, which lies N. by E. ¾ E. 7½ miles from Tagolo point, is about one mile in extent; it is low, flat, and wooded, with sandy shores bordered by reef that projects in a south-westerly direction from its west end to the distance of a mile, and breaks heavily.

Aligbay island, lying W. ½ N. 8¾ miles from Tagolo point, is about one mile in extent, and is low, flat, and wooded, with sandy shores; it has a fringing reef of no great extent.

Banks.—A coral patch of 3¾ fathoms lies S.S.E. of the centre of Aligbay island, distant 2½ miles, and about 4 miles farther south-east.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

ward is a small reef about 3 cables in extent, with a least depth of $1\frac{1}{2}$ fathoms, from which Tagolo point lighthouse bears N. 49° E., distant 6 miles; a patch of 4 fathoms lies $2\frac{3}{4}$ miles S.S.W. $\frac{1}{4}$ W. from Aligbay island, and it is probable that there are other patches in the vicinity.

Plan of Dapitan bay on 957.

DAPITAN BAY (*Lat. $8^{\circ} 38' N.$, Long. $123^{\circ} 26' E.$*), contained between Tagolo point to the north and Sikayak point to the south, is sheltered from all winds but those from the westward. The depth at the entrance of the bay is 17 fathoms, decreasing gradually to the beach in front of the town. The little port of Talaguilong is in the northern part of the bay.

The northern coast of the bay is high; Tubud point, $1\frac{1}{2}$ miles south of Tagolo point, is remarkable by having over it an isolated, conical hill, with Liuay islet a quarter of a mile westward of it. The islet is surrounded by a reef extending nearly half a mile from the point, and the shore between it and Tagolo point is foul to the same distance.

None of the forts shown on the plan are visible from the sea, being completely overgrown by trees. A church in the town with a galvanised iron roof is conspicuous.

It is reported that Liuay islet does not exist, but that there is a rock that dries at low water in the position where the islet is shown. The rock does not show at high water unless there is sufficient sea to cause it to break.

Anchorage.—Vessels anchor about three-quarters of a mile from the shore in $3\frac{1}{2}$ fathoms, sand, and wagons are driven out as far as possible to transfer cargo and passengers to and from the ships' boats. There is also anchorage farther out in from 4 to 7 fathoms. The church steered for on a N. 88° E. bearing leads to the anchorage.

Port Talaguilong is nearly circular in form, half a mile in diameter, almost completely shut in, and very convenient; a narrow steep reef lines the shores. The entrance passage is $1\frac{1}{2}$ cables wide between the reefs, and 9 fathoms deep, but in it is a small reef on which the depth is $3\frac{1}{2}$ fathoms; the depth of water inside the port is from $4\frac{1}{2}$ to 8 fathoms, mud.

Tides.—It is high water at Dapitan port at full and change, at 8h. 53m.; springs rise $4\frac{1}{4}$ feet.

Dapitan river and town.—The bar of the river has very little water on it at low water; *lanchas* can enter at high water. The town is on the left bank of the river, about half a mile from the beach on the east shore of the bay; it exports good cacao, wax, and maize; cattle are to be had in abundance.

General charts 2578, 943, 1263.

Plan of Dapitan bay on 957. Var. 1° 30' E.

NORTH-WEST COAST.—**Sikayak point** is surrounded by a reef which extends 3 cables from the point and fringes the shore to the north-eastward as far as Botogan point. There is a fort on Sikayak point completely overgrown by bushes.

Chart 2578, E. part of Sulu or Mindoro sea.

A great bay, clear and with good anchorage, stretches between Sikayak point and Blanca point. Three rivers, their mouths defended by forts, enter the bay. The land behind is mountainous.

Blanca point (*Lat. 8° 32' N., Long. 123° 5' E.*), one of the most remarkable features of the coast, is a perpendicular cliff of white stone, 26 feet high; it forms a long horizontal table covered by grass with no trees upon it. During the rainy season a rivulet of good water falls from this tableland. The vicinity of the point is shoal; at the distance of 2 cables from it there is a depth of $1\frac{3}{4}$ fathoms only. Anchorage may be had eastward of the point in $4\frac{1}{2}$ fathoms, and also in the bay between Blanca and Dauit points.

Dauit point, 4 miles south-west of Blanca point, is clear and steep-to, and can be recognised by a little hill that takes the form of an obelisk.

Tabonan point, about 5 miles south-westward of Dauit point, is high, rocky, and very steep, with a flat summit; there is anchorage in the bay which this point forms with Dauit point.

Dauigan point, about 7 miles south-south-west of Tabonan point, is also high and steep with a flat top; on its south-west side there is a narrow reef with 9 fathoms near it. Anchorage may be had in the southern angle of the bay between Dauigan and Tabonan points in a depth of 11 fathoms; the other parts of the bay are foul.

Sindangan bay, between Dauigan and Sindangan points, is 17 miles wide and 6 miles deep. The shores of this bay are exceedingly steep.

Anchorage may be had south of Dauigan point in 3 fathoms, and also east of Sindangan point in a depth of 11 fathoms, very close to the shore; everywhere else the bay is too deep, even near the shore, for anchorage.

Sindangan point is a steep rocky bluff, bordered by a narrow shoal of rocks and sand, with breakers at the distance of one cable.

Galera or Kipit point is low, flat, and sandy, with shoal water off it; the bay to the eastward, into which the River Kipit flows, is shoal with the depth of 6 fathoms at the distance of 2 miles from the coast; the surrounding land is low.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Murcielagos islets, which lie north about 3 miles from Galera point, are two islets situated on an oval reef about a mile long east and west, with depths of $4\frac{1}{2}$ to 7 fathoms around its edge. The islets are low, and the larger (the easternmost) is 3 cables in length. Anchorage may be had south-east of this islet in a depth of 7 to 15 fathoms, sand. The channel between the islets and Galera point is clear and safe, with a depth of 18 fathoms in the middle of it.

Coast.—To the westward of Galera point the coast is low, and bordered by sand beaches separated by rocky headlands, and cut into by several small streams. Anchorage may be had at one mile from the shore in a depth of 7 fathoms, fine sand. The wood on the coast is that named *Agojos*, a tree similar to the pine of Europe. High mountains can be seen inland, and also hills covered with *cogonal*.

Gorda point and **Coronada point** (*Lat. 7° 59' N., Long. 122° 14' E.*) are both high and steep, but Gorda point, which lies 4 miles N.E. by E. of Coronada point, is much the higher, and is liable, by vessels coming from the southward, to be mistaken for the western extremity of the land.

Winds on the north coast of Mindanao.—Both monsoons blow with strength on this part of the coast, and together with the tidal streams from the strait of Surigao raise a chopping sea. During the south-west monsoon the land breezes are regular; they blow from sunset to morning, and shift sometimes to south-east and east-south-east, but during *collas* the wind remains at south-west. *Collas* is the name given in the Philippines to the south-west gales that blow occasionally from July to October, with violent squalls and heavy rain.

During the north-east monsoon the land breezes are not regular, but still they are experienced when the monsoon is established, and the winds vary from north to north-east and east-north-east. The coast is very exposed at that season.

In navigating under sail, in either monsoon the coast of Mindanao should be approached in order to profit by the land breezes; but care must be taken to guard against the violent squalls that come off the mountains.

Currents.—Between Panaon and Kamiguin islands there is a constant current to the west in both monsoons, varying in strength according to wind and tide. South of Bohol the currents follow the direction of the prevailing monsoon. Near the coasts and within the great bays the current is influenced by the discharge from the rivers.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

WEST COAST of MINDANAO.—From Coronada point the coast is clean and steep-to as far as Balangonan point, which lies 15 miles S.S.W. $\frac{3}{4}$ W. Coronada bay, south of the point of the same name, is sheltered from all except west and south-west winds, and offers anchorage in a depth of 9 to 13 fathoms, sandy bottom. In the angle to the northward, where a small stream enters, the depth is $2\frac{3}{4}$ to 4 fathoms.

Plan of Port of Santa Maria on 957.

Balangonan point, composed of dark ferruginous rock, is low and very steep-to. The little bay to the north-east of it is more sheltered than that of Coronada, but its shores are very steep, so that to get into a depth of 10 fathoms it is necessary to go very close in shore. At a mile to the northward of the north point of this bay there is a small islet, clean and steep.

Port Santa Maria (*Lat. 7° 46' N., Long. 122° 6' E.*).—This well-sheltered little port is situated immediately to the southward of Balangonan point. It is about a quarter of a mile wide at the entrance and a mile deep to the south-east, and contains two basins very convenient for small vessels. In the middle of the port the depth is 15 fathoms, and a little less near the shore. A narrow reef lines the coast and extends to the distance of one cable from the western shore at the entrance of the western basin; there is also a reef extending one cable northward of the point which projects from the south shore and forms the division between the two basins. The shores are low and covered by forests of good trees; amongst them teak is to be found. The anchorage area is small, that in the western basin off the mole being only about $1\frac{1}{2}$ cables in diameter and in the eastern basin about $3\frac{1}{2}$ cables. Water can be obtained from a small stream in the eastern end of the port.

Dulunguin point, south-west of Port Santa Maria, is rocky, of no great height, and steep-to; it resembles Balangonan point, and, coming from the southward, may be taken for it. At 3 cables from the coast between this point and Port Santa Maria there are four detached rocks, clean-to.

Chart 2578, E. part of Sulu or Mindoro sea.

Sikogon bay, between Dulunguin and Sikogon points, is clean, deep, and bordered by a beach of white sand, where two small rivers discharge; some rocks lie near the shore in the middle of the bay. The depth at the distance of a quarter of a mile from the shore is 5 to 6 fathoms, sand.

Sikogon point is rocky, clean, and steep-to.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Panabutan bay is situated between Panabutan point, $1\frac{1}{4}$ miles south-eastward of Sikogon point, and Siraguay point. It is over one mile wide at the entrance, and extends about the same distance eastward. It is reported that Panabutan point is clean at a distance of half a cable, and also that the northern part of the bay is not correctly charted. The chart shows depths of 10 and 11 fathoms in the bay.

The Rivers Sikogon and Siraguay are shallow. The natives are numerous in this place; they grow maize and tobacco, and carry on trade with the Sulu islands. Wood and water can be obtained.

Light.—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 30 feet above the sea, from a platform on the top of a white house near the beach on the eastern side of Panabutan bay.

This light steered for on an East bearing will lead to anchorage in $4\frac{1}{2}$ fathoms, sand, about a quarter of a mile from the shore.

Kauit bay, situated 3 miles southward of Panabutan bay, is semi-circular, and about three-quarters of a mile in diameter, with sandy shores and small steep reefs on both sides of the entrance. Near the south shore there is an islet of one cable extent, clean and steep on the eastern side, with a narrow reef on the western side. In the bay there is good anchorage in depths of 5 to 6 fathoms, sand, under shelter of the islet.

Kauit point (*Lat. $7^{\circ} 31' N.$, Long. $122^{\circ} 5' E.$*) is high and steep; the sea face is composed of red earth; the summit is rounded and covered with trees.

Coast.—From Kauit point to Batotindok point, which lies 9 miles south-south-westward, the coast is clear and steep, and forms little bays between the intermediate Points Piakan and Nangan, which are high, rugged, and steep. There is a small islet northward of Nangan point close to the shore. This part of the coast, like all the west coast of Mindanao, presents an agreeable aspect of hills covered with verdure and cultivated land, with a great number of houses.

Plan of Sibuko bay on 957.

Batotindok point is high, clean, and steep, with a flat summit; at 130 yards from it is a small pointed rock, from which the point appears to take its name—Horn rock; between this point and Nangan point there is anchorage near the shore in a depth of 3 to 8 fathoms.

Sibuko bay, which lies between Sibuko point, $2\frac{1}{2}$ miles south of Batotindok point and Buril point, is $3\frac{3}{4}$ miles wide at the entrance and penetrates $2\frac{1}{2}$ miles to the eastward, with steep shores bordered by a long beach of sand; there is a small river at each end of the beach where boats can enter and obtain water, even at low tide. The

General charts 2578, 943, 1263.

Plan of Sibuko bay on 957. Var. 1° 30' E.

depth in the bay is not less than 27 fathoms, except when very close to the beach, where 11 fathoms are found. The anchorage is good, but a sea sets in with westerly winds. The town of Sibuko is 2 miles inland. The people are peaceful, and the land cultivated. Provisions are procurable.

Chart 2576, Sulu archipelago.

Coast.—Southward of Sibuko bay the coast is high, clean, and steep, and bordered by sand beaches, interrupted by rocky cliffs as far as Batalampon point, the western extreme of Mindanao. From Batalampon point to Samboanga the coast curves gradually round southward and eastward, and is low, covered with trees, and bordered by steep sand beaches, with a depth of 14 fathoms at a cable's distance. Coasters going from Samboanga when the wind and tide are against them land their crews and track their vessels to Caldera point.

Batalampon point (*Lat. 7° 6' N., Long. 121° 55' E.*) is of even height and steep, with a flat crown; Alimpaya point, about a mile to the northward of it, is flat and sandy; Dumalin and Caldera points are sand beaches; all these points, as also the rounded coast they define, are clean and steep-to.

The tidal streams, which at springs reach a velocity of 5 knots an hour, set towards Caldera point with great force.

The coast from Caldera to Samboanga and the anchorage off Samboanga have been described with Basilan strait in Chapter IV.

General charts 2578, 943, 1263.

CHAPTER VIII.

VERDE ISLAND PASSAGE TO SAN BERNARDINO STRAIT.—MARINDUQUE, BURIAS, TIKAO AND MASBATE ISLANDS.—NORTH AND WEST COASTS OF SAMAR.

VARIATION IN 1911.—Slightly increasing.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E.

SOUTH COAST OF LUZON.—The description of the south coast of Luzon is here continued from Chapter V.

From Lokoloko or Sigayan point the shore trends 4 miles N.E. by E. to Bantiki point. The coast hills between these headlands are about 400 feet high and wooded. This vicinity appears sunk when seen from the neighbourhood of the southern part of Marinduque, there being high mountains on either side, but not behind these points.

TAYABAS BAY. — Bantiki point (*Lat. 13° 41' N., Long. 121° 28' E.*), the western entrance point of Tayabas bay, is a wooded headland, 350 feet high, and is a conspicuous landmark when entering the bay. It is steep to on its southern and eastern sides, but on its northern side a narrow coral reef begins, which gradually widens and fringes the shore of Kolokonto bay and extends around Sibukin point.

Mount Banahao lies nearly North of Bantiki point, and about 12 miles from the coast. It is a truncated cone, 7,066 feet high, and is a conspicuous landmark when not obscured by clouds.

Kolokonto bay, between Bantiki and Sibukin points, is about 2 miles wide, and extends over one mile south-westward. There is a small inlet at the head of the bay, which serves as a shelter for small craft in south-west gales.

There is a small islet within it covered with trees, and in the entrance are several rocks which mostly dry at low water.

Good anchorage in 15 fathoms, protected from south-west winds, may be found about half a mile from the shore, with Bantiki point bearing S.E. by E.

Coast.—From the northern point of Kolokonto bay the coast trends northward, with a slight curve westward, for 5½ miles to the

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 50' E. mouth of the Nayan river, thence north-eastward for 10 miles to the Tayabas river. It is low, wooded, and bordered by sand beaches, which are intersected by small streams.

Nayan river has about 3 feet of water on the bar, deepening inside to 9 feet; it affords shelter to small coasters.

San Juan de Bokbok is a small town situated about 4 miles westward of the entrance to the Nayan river. The road leading to the town starts near the mouth of a small stream which discharges about $1\frac{1}{2}$ miles southward of the Nayan.

Dangers.—A reef with one fathom over it lies $1\frac{1}{2}$ miles south-south-east from the mouth of the Nayan river, and one mile off-shore. Within this reef, and extending south-westward for about 2 miles, is a dangerous reef, shoaling from 7 and 8 fathoms to $1\frac{1}{4}$ and 2 fathoms.

There is another reef, with less than 3 feet on it, lying $2\frac{1}{2}$ miles north-eastward from the mouth of the Nayan river, and about one mile off-shore; shoal water continues north-eastward at a short distance from the shore to the entrance of the Tayabas river.

Anchorage.—Vessels can anchor off the coast between Kolo-konto bay and the mouth of the Tayabas river, at about a quarter of a mile from the shore, in a depth of 12 fathoms, mud.

Chart 3697, Lucena anchorage, &c.

Tayabas river is three-quarters of a cable wide at the entrance; its bar is 3 cables wide, and in the entrance channel the depth is about one fathom at high water, increasing within to 2 fathoms. The depths on the bar seem to be decreasing, and small boats cannot enter the river at low tide.

Lucena, a town of considerable importance, with a population of 9,375 in 1903, is situated about $2\frac{1}{2}$ miles from the coast, between two small rivers, which, uniting lower down, form the Tayabas river. Lucena is a telegraph station. Oil fields have been found in Tayabas province.

LIGHT (*Lat. 13° 54' N., Long. 121° 36' E.*).—A red fixed light, visible 9 miles in clear weather, is exhibited at an elevation of 61 feet above high water, from a white framed structure, 53 feet high, situated on the beach near high-water mark, on the western side of the mouth of the Tayabas river.

Shoal.—At about $1\frac{3}{4}$ miles southward of Lucena light are several shoal patches of from $2\frac{1}{2}$ to 5 fathoms, situated on a rocky bank about a mile in length east and west, within the 10-fathoms line.

Lucena anchorage lies half a mile southward of the bar of the Tayabas river. Here there is anchorage in 6 or 7 fathoms, mud, or,

General charts 2577, 943, 2661b, 1263.

Chart 3697, Lucena anchorage, &c. Var. 0° 50' E.

nearer the bar, in 5 fathoms. The anchorage is protected from north-east winds by Tayabas point, which projects southward on the eastern side of the river entrance, and by a reef, on which are some small islets, extending about 8 cables south-south-eastward from the point.

A good berth is with the light at the mouth of the river bearing N. 4° E., and Tayabas point N. 56° E.

Directions.—When approaching Lucena anchorage, bring the light at the mouth of Tayabas river to bear N. by E. when at least 2 miles distant from it, and steer for it, anchoring as requisite.

Reef.—From the shoal which extends south-south-eastward about 8 cables from Tayabas point a reef extends $6\frac{1}{2}$ miles in an easterly and southerly direction, fronting the coast and projecting to a distance of $3\frac{3}{4}$ miles from Bokbok (Bantiki) point, the south-western point of Pagbilao bay; it then turns northward, leaving a channel about three-quarters of a mile wide between it and Pagbilao Grande island. On the eastern part of the reef are a number of spots which dry at low water. Tayabas point bearing W. by N. $\frac{1}{2}$ N., or the south end of Pagbilao Chica bearing E. by N. $\frac{1}{2}$ N., leads southward of the reef.

Buoy.—The southern extreme of the reef at the western side of the entrance to Pagbilao bay is marked by a black can buoy, marked "No. 1" in white, moored in 10 fathoms.

Pagbilao bay (*Lat. 13° 55' N., Long. 121° 43' E.*), which lies between Bokbok point, about 6 miles eastward of Tayabas river entrance, and Pagbilao Grande island, is of wide extent, but the available part of it within the 3-fathoms contour is reduced by reefs to a circular space about $1\frac{1}{2}$ miles in diameter. The depth of the entrance channel is from 10 to 14 fathoms; and of the space within, from $3\frac{1}{4}$ to 8 fathoms, mud.

Angas point, on the western part of the northern shore of the bay, is about 25 feet high, has a bare surface, and is easily recognised; Pagbilao church, $1\frac{1}{3}$ miles north-westward of it, is visible from a considerable distance, and is a good landmark.

Patayan island, about 90 feet high, lies in the northern part of the bay, three-quarters of a mile south-eastward of Angas point, and is prominent; it is surrounded by shoal water.

Directions.—To enter Pagbilao bay give the south-western part of Pagbilao Grande a berth of 3 cables, and steer in with Angas point well open westward of Patayan island, bearing N. 25° W. Good anchorage will be found in 5 fathoms with the hill on Patayan bearing N. 14° W., and the southern extreme of the western entrance point S. 59° W. Light-draught vessels may anchor farther in, and obtain more shelter in south-west winds.

General charts 2577, 943, 2661b, 1263.

Chart 3697, Lucena anchorage, &c. Var. 0° 50' E.

Pagbilao Grande island is of triangular form, and nearly joined to the mainland, forming with it the bay of Pagbilao to the west, and Port Laguimanok to the east; Mount Mitra, on the north-east part, is 530 feet high. The southern point is steep-to, having a depth of 12 to 14 fathoms, mud, at a quarter of a mile from it; this is the point to make for to enter Pagbilao bay. Pagbilao Chica is united to the larger island by a strip of sand; it is crescent-shaped, forming to the westward the little bay of Kapulaan, at the entrance of which there is a depth of 14 fathoms, diminishing to 5 fathoms at the edge of the shoal water that fills the upper part of the bay. Kapulaan bay affords good sheltered anchorage during the north-east monsoon, but is open to the south-west. Mount Lipata, near the southern end of Pagbilao Chica island, is 599 feet high, and has a large white spot on the south-west side near the top, which is very conspicuous and may be seen 20 miles off in clear weather.

Port Laguimanok (*Lat. 13° 55' N., Long. 121° 48' E.*), lying eastward of the Pagbilao islands, is reduced by reefs from the coasts on both sides to a channel $2\frac{1}{2}$ miles long and less than half a mile wide, in which the depths gradually decrease from 10 to 2 fathoms, sand and mud. The northern part of the port is shoal. Great care must be taken to avoid the reefs which extend from both sides of the entrance, narrowing the channel considerably.

Laguimanok point, the western extremity of the land on the eastern side of the port, is composed of low bluffs, fringed by rocks. It is well wooded, and rises to a height of 137 feet; Laguimanok village, from which lumber is shipped, lies on the point.

Islets and dangers.—Eastern side.—Mangayao islet, half a mile long north-east and south-west, and a quarter of a mile broad, lies on the east side of the entrance to Port Laguimanok, about $1\frac{1}{4}$ miles eastward of Pagbilao Chica. It is wooded, the northern part being fringed with mangroves; the southern point is sandy. Tubig point, the western extreme, is a low bluff surrounded by rocks, and there are also rocks off the southern point. Mangayao is an islet at high water only, being surrounded and connected with the shore by a mud-flat dry at low water.

A reef, partly dry at low water, extends $1\frac{1}{4}$ miles southward from Mangayao islet, and at $2\frac{3}{4}$ miles south-eastward from that islet, and more than $1\frac{1}{2}$ miles off-shore, is a rocky patch of $2\frac{3}{4}$ fathoms, with $6\frac{3}{4}$ fathoms at $1\frac{1}{4}$ miles farther.

High islet, two-thirds of a mile north-westward of Tubig point, is small and 65 feet high; a reef extends about 2 cables southward of it. Kalaba islet, one-third of a mile northward of High islet, is very small, and 40 feet high.

General charts 2577, 943, 2661b, 1263.

Chart 3697, Lucena anchorage, &c. Var. 0° 50' E.

Talaban islet, 39 feet high, lies across the head of the navigable channel; there are several small islets in the northern part of the port, where the water is shoal.

Western side.—Two shoals lie on the western side of the entrance, with Laguimanok point bearing N. 4° E., distant $1\frac{1}{2}$ and 2 miles; the southern shoal has $2\frac{1}{4}$ fathoms and the northern $1\frac{1}{2}$ fathoms on it.

Directions.—To enter Port Laguimanok, bring Kalaba islet and Laguimanok point in line, N. 5° W., and steer for them; when Tubig point, Mangayao islet, is abeam about $6\frac{1}{2}$ cables distant, the vessel will be past the shoals on the western side of the channel, and should alter course to N. 23° W. for the west end of Talaban islet, and anchor according to draught. Small craft can find protected anchorage northward of Talaban islet.

Tides.—It is high water, full and change, at Port Laguimanok, at 11h. 30m.; springs rise 5 feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—The south coast of Luzon, from Port Laguimanok to Tuquian point, 29 miles south-eastward, is generally low, with a flat sandbank, and fringed with reefs of varying width and broken in places by mangroves. Inland, the country is thinly wooded near the shore, with scattered patches of cultivated ground. At a greater distance back, low and heavily-wooded hills begin.

Anchorage in case of necessity may be had nearly anywhere along this coast, but the principal places are Unisan, Pitogo, and Makalelon. Vessels not intending to make a stop on this part of the coast should give it a berth of at least $2\frac{1}{2}$ miles, as dangerous detached reefs lie nearly that distance from the shore.

Malatandan point (*Lat. 13° 50' N., Long. 121° 57' E.*), about 9 miles east-south-eastward from Port Laguimanok, is bold, rocky, wooded, and formed by a hill 179 feet high, surrounded by low, level land. The western side of the point is steep-to, but from the southern part a coral reef extends about half a mile southward.

Reef.—About three-quarters of a mile S. 59° W. from Malatandan point is the north-eastern end of a dangerous reef, partly dry at low water, that extends nearly a mile south-westward, with a width of about a quarter of a mile. It is surrounded by depths of from 9 to 12 fathoms. From its south-western end, Silankapo point bears S. 70° E.

Kalaylayan bay, immediately south-eastward from Malatandan point, is about $1\frac{3}{4}$ miles wide at the entrance, and extends over half a

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. mile north-eastward. The head of the bay is shoal, and there is a wide sand beach, dry at low water. The town of Unisan, an occasional port of call for coasting steamers, lies at the head of the bay. The small river discharging at the town has very little water on the bar at low water. Small coasters are built here.

Anchorage.—Kalaylayan bay affords good anchorage, sheltered only in the north-east monsoon. To approach the anchorage, steer for the town on a N. 34° E. bearing, and anchor in 4 fathoms, soft mud, when Malatandan point bears N. 29° W.

Silankapo point, situated about $2\frac{1}{2}$ miles south-eastward from Malatandan point, is low, and generally fringed with mangroves at its extremity, but rises to a height of 295 feet at a little more than a mile inland.

Mabio point, about $4\frac{1}{2}$ miles south-eastward of Silankapo point, is low, covered with mangroves, and fringed with coral. Between these points the shore consists of sand beach alternating with mangroves; about midway a small stream discharges, near the mouth of which are some conspicuous black rocks, about 8 feet high, which make a good landmark for small vessels seeking anchorage.

Reefs.—The most outlying dangers in the vicinity of Mabio point are a small reef with 4 fathoms on it, lying west-south-westward of the point, with Silankapo point bearing N. 46° W., and another reef half a mile north-westward of it with a depth of $2\frac{1}{4}$ fathoms, both $1\frac{1}{2}$ miles from the shore.

Pitogo (*Lat. $13^{\circ} 47' N.$, Long. $122^{\circ} 5' E.$*), the principal town in this vicinity, lies at the head of an irregularly-shaped indentation about $2\frac{1}{2}$ miles wide between Mabio and Pagbabaugnan points. It is built on a point of land between two small rivers. The church is a conspicuous stone building, with a tower at the eastern end. Pitogo is visited weekly by a small coasting steamer.

Shoal.—A rocky shoal of 8 feet lies one mile S. 18° W. from Pitogo church.

Anchorage.—Good anchorage may be found by bringing the church to bear N. 44° E., and steering for it, and anchoring in 5 fathoms when it is about three-quarters of a mile distant, care being taken to avoid the shoal above mentioned.

Small vessels, and those with local knowledge, may proceed closer in.

Reef.—At about 2 miles southward from Pitogo is the western extremity of a large coral reef that dries at about half-ebb; about a quarter of a mile southward of the western extreme of this reef is a small patch of $1\frac{1}{2}$ fathoms, with deep water around.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Makalelon is a small town lying at the mouth of the small river of that name about 4 miles south-eastward of Pitogo. The reefs in this vicinity extend from one to 2 miles from the shore.

Anchorage.—Vessels should anchor with the large house in Makalelon bearing N.E., and be careful not to go into less than 7 fathoms.

Reef.—A small dangerous reef, with a least depth of $2\frac{1}{4}$ fathoms, lies $1\frac{1}{4}$ miles from the shore, with the town of Hingoso bearing S. 71° E., distant $2\frac{3}{4}$ miles.

Hingoso is a small village lying about 4 miles south-eastward of Makalelon. Small steamers call here weekly, and also at Makalelon. Vessels seeking anchorage off Hingoso should steer for the village on a N. 89° E. bearing, and anchor according to draught.

Reef.—South-westward and southward of Hingoso, and from one to 2 miles off-shore, is a chain of detached reefs and one rock awash, all of which may be avoided by keeping Tuquian point bearing nothing southward of S. 51° E.

Tuquian point (*Lat. $13^{\circ} 36'$ N., Long. $122^{\circ} 12'$ E.*) is low, covered with mangroves, and not conspicuous when seen from south or south-east; it is fringed by a reef which extends a quarter of a mile westward and about two-thirds of a mile southward from it.

Tidal streams.—In the passage between Tuquian point and Mompog island the flood tide sets to the south-east and the ebb to the north-west.

Coast.—From Tuquian point the coast trends in an east-south-east direction for about 9 miles to Ahus point, with Tagabas and Katanauan bays between.

TAGABAS BAY, about 2 miles eastward of Tuquian point, is semicircular in shape, and about $1\frac{1}{2}$ miles in extent. It has a depth of 7 fathoms in the entrance, shoaling very gradually towards the head, and affords the safest anchorage on the Luzon coast between Port Laguimanok and Ragay gulf.

Putting-Buhangin shoal is a detached coral reef, dry at low water, lying about three-quarters of a mile west-south-west from the western extreme of Sandoval point. A shifting sandbank on the reef uncovers about half-ebb. There is shoal water eastward of the reef, with a channel for coasters between it and the point. A patch of 3 fathoms lies about one mile west-south-west from Putting-Buhangin shoal, with deep water between. These shoals are a danger to navigation, but serve to partially protect Tagabas bay from south-westerly seas.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Directions.—To enter Tagabas bay, bring the northern side of the western extremity of Sandoval point to bear N. 89° E., before Tuquian point bears anything westward of N. 1° W., and steer for it. When Puting-Buhangin shoal is abeam, haul north-eastward and anchor according to draught.

Sandoval point, separating Tagabas and Katanauan bays, is low, heavily wooded, and fringed with mangroves; it is surrounded by reefs not exceeding one-third of a mile in width. Sandoval point is nearly straight on its seaward side for $1\frac{1}{2}$ miles, and is connected with the mainland by an isthmus less than half a mile wide.

Katanauan bay, lying eastward of Sandoval point, is about 3 miles wide between the entrance points, and extends nearly $1\frac{1}{2}$ miles northward. Both entrance points are fringed with reefs; that off Sandoval point, the western entrance point before mentioned, has several rocks that dry at half-ebb. From Pala point, on the east side, the reef extends westward a quarter of a mile. Inside the bay the reefs become narrow, and finally disappear, leaving a clean sandy beach along the shore of the bay. From a depth of 10 fathoms off the entrance, the water shoals gradually towards the head of the bay, where 3 fathoms will be found within half a mile of the shore. There are no dangers in the bay besides the reefs mentioned. The Katanauan river, which discharges at the head of the bay, affords shelter for small craft, but the entrance is obstructed by a bar of sand, dry at low water, so that no large craft can enter.

Katanauan (*Lat. 13° 36' N., Long. 122° 19' E.*), the largest town in this vicinity, and a port of call for mail steamers, lies at the head of the bay at the mouth of the river of the same name. The church, of grey stone, with a small dome, forms a good landmark.

Directions.—No particular directions are necessary for entering Katanauan bay. Vessels usually steer for the church on a N.N.E. bearing, and anchor in 5 fathoms, sand, at about one mile from it. Small coasting steamers anchor farther in, according to their draught.

Reefs.—Between the eastern entrance point of Katanauan bay and Ahus point, about 2 miles east-south-eastward, the shore reef extends about 4 cables off; outside it, the bottom is sand, sloping rapidly to mud. Less than half a mile south-westward of Ahus point is a small detached reef, awash at low water; this is the only off-lying danger in this vicinity.

Coast.—About 3 miles northward of Katanauan bay is the beginning of a range of heavily-wooded hills extending in a south-south-east direction, and gradually increasing in height to about 700 feet. They approach the coast near Ahus point, and border it as far as Ayoni bay.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E. Between **Mulanai** and the **Mataha** river, about 5 miles south-eastward, the hills come close to the beach, which is steep-to. From **Ayoni bay**, southward, they recede, and the country is more open, wooded, and grassy, and 3 or 4 miles inland rises to a range of mountains, mostly wooded, from 1,200 to 1,400 feet in height.

Mulanai is a small town lying at the mouth of the river of the same name, about 3 miles south-eastward from **Ahus** point; the shore reef between these points is not more than half a mile wide. **Mulanai** church has a high white tower.

Anchorage.—Good anchorage, protected only during the north-east monsoon may be found off **Mulanai**. To approach it, steer for the church on a N. 69° E. bearing, and anchor in 5 fathoms, sand, about 4 cables from the shore, with a large boulder on the port hand abeam.

Mount Maklayao, about 2 miles N. 85° E. from **Mulanai**, appears as a broad, flat-topped, and heavily-wooded peak, 1,240 feet high; it rises very little above the other hills in its vicinity.

Coast.—Just southward of **Mulanai** the shore reef extends $3\frac{1}{2}$ cables off, but thence to **Mataha** river it is very narrow and steep-to.

Lipata point, about 2 miles from **Mulanai**, has white cliffs, which make it a good landmark; it is not conspicuous as a point.

Ayoni bay, $6\frac{1}{2}$ miles south-eastward of **Lipata** point, is an open roadstead affording good anchorage in the north-east monsoon. The water shoals gradually from a depth of 15 fathoms, mud, at one mile, to 5 fathoms, sand, at half a mile from the beach. A reef extends half a mile from the southern point of the bay.

Coast.—From **Ayoni bay** the coast trends southward, with a curve eastward for 7 miles to **Subunguin** point, and is fringed with reef to a distance of half a mile in places. Small detached reefs with from 3 feet to 5 fathoms on them lie at distances varying from a half to $1\frac{1}{2}$ miles from the shore (*see* the chart). **Bondok** is a small village lying slightly back from the beach, about 4 miles south-eastward of **Ayoni bay**. The church, a long building in the north part of the village, is readily identified.

Shoals.—Two reefs covered by depths of 5 and $4\frac{3}{4}$ fathoms, respectively, lie $1\frac{1}{2}$ miles S. 83° W. and $1\frac{1}{2}$ miles S. 80° W. from the church at **Bondok**. The latter shoal lies one mile N. 76° W. from the south point of the river entrance at **Bondok**.

Anchorage.—Good anchorage, in the north-east monsoon, may be had off **Bondok** in 9 or 10 fathoms, mud and sand, about three-quarters of a mile off-shore. Vessels should not anchor in less than 9 fathoms, as inside 5 fathoms the water shoals rapidly. Small vessels may anchor closer in by following the narrow channel through the shore reef.

Directions.—From the northward keep at least one mile from
General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. the shore until Bondok church bears S. $81^{\circ} E.$, when steer for it and anchor as directed. Vessels from the westward should approach with the church bearing N. $67^{\circ} E.$

Subunguin point, about 3 miles southward from Bondok, is well wooded, and about 250 feet high. It is fringed with mangroves, and surrounded by a reef, narrow and steep-to on the west side.

Reef.—A rocky shoal, $1\frac{1}{2}$ miles in length, north-west and south-east, and nearly a mile wide, within the 10-fathoms line, is partly awash at half-tide. It is steep-to on the western side, and lies $2\frac{1}{4}$ miles north-westward of Subunguin point, and $2\frac{1}{2}$ miles from the coast to the eastward. The channel between this shoal and the shoals westward of Bondok is one mile wide, deep, and clear of danger.

Clearing marks.—Subunguin point, bearing S. $33^{\circ} E.$, leads between the reef just described and those extending westward from Bondok. Pinamuntangan point bearing nothing southward of S. $31^{\circ} E.$ leads south-westward of the reef.

Aguasa bay, southward of Subunguin point, is about half a mile in extent; the head of the bay is fringed by a wide reef, dry at low water. A small detached reef with $1\frac{1}{2}$ fathoms on it lies about 9 cables S. $32^{\circ} W.$ from a bold cliff 100 feet high, and partly covered with vegetation, on the south-west side of Subunguin point.

Small vessels may find anchorage in the middle of the bay, in from 3 to 5 fathoms, sand.

Pinamuntangan bay, immediately northward of the point of the same name, is of no commercial value. There is a small sand beach at the head, and on the north side of the bay are several detached shoals about one-third of a mile from the shore.

Pinamuntangan point, the western point in this vicinity, is heavily wooded, fringed with mangroves, and surrounded by a narrow reef.

The coast from Pinamuntangan point trends a distance of $7\frac{1}{2}$ miles to the south-east to Bondog point, and is bold, clean, and steep-to.

Cabezo de Bondog (Bondog head) is a mountain 1,250 feet high, visible in clear weather at a distance of 30 miles; it stands about one mile northward of Bondog point.

Bondog point (*Lat. $13^{\circ} 10' N.$, Long. $122^{\circ} 36' E.$*) is the southern extremity of the peninsula between Tayabas bay and Ragay gulf; it is a redoubt-like formation of limestone, and has a bluff, 50 feet high, rising from a platform of old coral. The fact that the point appears like masonry, is greyish in colour, and remarkably bold, makes it easy to recognise. It is clean and steep-to, and can be rounded in safety at a distance of a quarter of a mile.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Coast.—From Bondog point the coast trends north-eastward for 7 miles to Arena point, the most easterly point of the peninsula. It is clean and steep-to, with the exception of two small reefs off Pagsanhan point, and can be passed at a distance of one mile. Eastward of Bondog point the hills become lower and more grassy, and at Pagsanhan point trend away from the coast, opening the Pagsanhan and Talisay valleys.

Pagsanhan point, about 3 miles eastward of Bondog point, is low, wooded at its extremity, and surrounded by a very narrow reef. Pagsanhan river, with about 4 feet on the bar at low water, discharges just northward of the point. Talisay river, 2 miles eastward of the Pagsanhan, has coral before its entrance, and is blocked with boulders.

Reefs.—At the distance of 3 miles east-north-east of Bondog point, and about half a mile from the shore, there is a small reef with rocks awash at low water. Inside the reef there are depths of 5 and 6 fathoms, gradually decreasing to the shore.

A small reef with about one foot of water on it lies about half a mile S. 34° W. from Pagsanhan point, and 3 cables off-shore.

MARINDUQUE ISLAND, situated before the eastern entrance of Verde island passage, is nearly circular, with its greatest diameter 24 miles; it is mountainous and well wooded, with a range of hills on its eastern side running north and south, consisting of the mountains Tapan, San Antonio, and Marlanga, the latter, situated in the south part of the island, being the highest, with an elevation of 3,877 feet. The soil is fertile, and the principal exports are hemp, copra, and firewood.

There are five towns situated on or near the coast, off which sheltered anchorage may be found according to the season. There are three harbours of refuge, Port Balanakan, Santa Cruz, and Masagasai bay, where good shelter may be found.

NORTH COAST.—**San Andres point** (*Lat. 13° 34' N., Long. 121° 52' E.*), the north-western extremity of the island, is a small steep-to peninsula, rising to a height of 886 feet.

Between San Andres point and Santa Cruz point, about 8 miles eastward, the coast is rough and irregular; it is divided into two bays by Trapichikan point. The western bay, though lined with rocks, is deep, having 22 fathoms in the middle; the eastern bay is foul, and faced by the Banot islands, the outer one of which, lying about one mile north-eastward from Trapichikan point, is high and bold, but of little value as a landmark except when close in-shore.

Plan of Santa Cruz harbour and Masagasai bay on 191.

Santa Cruz point, on the western side of the northern entrance to Santa Cruz harbour, is over 100 feet high, and fringed on its northern extremity by a narrow reef. In this vicinity there are no

General charts 2577, 943, 2661b, 1263.

Plan of Santa Cruz harbour and Masagasai bay on 191. Var. $0^{\circ} 50' E.$ outlying dangers northward of a line running east and west through Santa Cruz point, with the exception of a patch of $2\frac{1}{2}$ fathoms about half a mile north-westward of the point, beyond which the water deepens rapidly. Foul ground extends about 3 miles in an east-south-east direction from Santa Cruz point, and forms the western side of the northern channel into Santa Cruz harbour.

Santa Cruz island, lying about 4 miles south-eastward of the point of the same name, is about $2\frac{3}{4}$ miles long north-west and south-east, and is low and flat; the south-western third of the island is mangrove swamp, and the remainder cultivated land and cocoanut trees. The island is fringed by reefs, which extend about half a mile northward from the north-west point and about $3\frac{1}{2}$ cables south-eastward from the south-eastern point.

Santa Cruz harbour (*Lat. $13^{\circ} 30' N.$, Long. $122^{\circ} 4' E.$*), formed by the passage between Marinduque and Santa Cruz islands, is safe and fairly capacious, has excellent holding ground, and is especially important as a harbour of refuge for vessels overtaken by bad weather when in this vicinity. The northern entrance is over half a mile wide between the reefs, and is deep; the edge of the foul ground on the west side of the channel is three-quarters of a mile from Santa Cruz island; the eastern entrance is a quarter of a mile wide between the reefs, and has a least depth in mid-channel of 6 fathoms, southward of the east end of Santa Cruz island. On the south side of the eastern entrance, at about one mile eastward of Mango point, shoal water under 5 fathoms extends half a mile north-eastward with patches of 3 fathoms on the outer part. Santa Cruz river, which discharges into the south-western part of the harbour, is very shoal, and only navigable by small boats at high water. The Tagum river discharges eastward of the Santa Cruz river, but is fronted by mud-flats, dry at low water, with a channel with a depth of only one foot through them.

Good protected anchorage may be found on the south side of the harbour in from 5 to 10 fathoms; a good berth is in 9 fathoms, soft mud, with the southern extreme of Santa Cruz island bearing $S. 89^{\circ} E.$, and the western extreme of the same island $N. 22^{\circ} W.$ The usual anchorage for small craft desirous of communicating with Santa Cruz is south-eastward of Tabignan point, the north entrance point of the Santa Cruz river. Vessels of not more than 7 feet draught may proceed between two rocky reef points southward of Tabignan point, and anchor in $1\frac{1}{2}$ to 2 fathoms, sheltered from all winds.

Light.—A *red fixed* light, elevated 24 feet above high water, and visible 7 miles in clear weather, is exhibited from a concrete pillar erected on the reef on the western side of Santa Cruz harbour, $S. 77^{\circ} W.$, from the south-west point of Santa Cruz island. The light is unwatched.

General charts 2577, 943, 1263.

Plan of Santa Cruz harbour and Masagasai bay on 191. Var. 0° 50' E.

Directions.—Vessels entering Santa Cruz harbour by the northern channel should not bring Santa Cruz point to bear anything northward of S. 89° W. until the east point of Santa Cruz island is well open of the north-west point of that island, bearing S. 51° E., in order to give the foul ground on the western side of the entrance a good berth. When Tabignan point, low, and mangrove-covered, on the north side of the entrance to the Santa Cruz river bears S. 1° E., steer for it until the north-west point of Santa Cruz island is abeam, when skirt the west and south-west shores of the island at a distance of from 2½ to 3½ cables until the anchorage is reached. For clearing the dangers on either side of the entrance, a mark is recommended by the local traders consisting of a bluff, not shown on the chart, situated on the south side of the harbour, in line with the south-western extreme of Santa Cruz island, S. 15° E. At night, the light kept bearing S. 8° W. leads through the northern entrance.

The eastern entrance is a quarter of a mile wide, and both sides are fringed with reefs. Vessels approaching it should bring Mango point, on the south side of the channel, to bear S. 89° W., and steer for it on that bearing; when the eastern extreme of Santa Cruz island is abeam, alter course to N. 76° W., keeping about mid-channel until abreast of Mango point, when the vessel may be hauled westward for the anchorage. At night, the light kept bearing N. 79° W. leads through the eastern entrance.

Tides.—It is high water, full and change, at Santa Cruz harbour, at 11h. 30m. (approximate); springs rise about 6 feet. During the flood a weak stream sets in through the northern channel and out through the eastern channel, conversely during the ebb.

Santa Cruz.—The town of Santa Cruz, reported to be the second town of importance in Marinduque island, lies about three-quarters of a mile southward of the Santa Cruz river, about 1½ miles above its mouth. A road leads from the town to the river, where there is a warehouse and a small wharf. Small coasting steamers call off the mouth of the river two or three times a week.

Maniuayan island (*Lat. 13° 32' N., Long. 122° 7' E.*), lying nearly 1½ miles north-eastward from Santa Cruz island, is of irregular shape, and is over 2 miles long north-west and south-east, and nearly one mile wide. It is low, flat, and surrounded by reefs; cocoanuts are cultivated. The channel between Santa Cruz and Maniuayan islands is three-quarters of a mile wide, with a least depth of 8 fathoms in mid-channel. On the western side of the channel is a detached shoal, with a drying reef on its south-eastern part situated about half a mile from the north-east side of Santa Cruz island. Tagum point in line with the summit of the easternmost hill on Salomague island, S. 22° E., leads through.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Mompog island, lying 2 miles eastward of Maniuyan, and 5 miles S. by W. $\frac{1}{2}$ W. from Tuquian point, in Luzon, is about $1\frac{1}{2}$ miles in extent. It is rugged and steep, rises quickly near the east side to a height of 282 feet, and then slopes gently westward. Mompog is surrounded on its north, east, and south sides by a narrow steep-to reef; on the west side the reef is wider. The channel between the two islands is $1\frac{1}{2}$ miles wide, with a least known depth of $4\frac{1}{2}$ fathoms, but the rocky bottom is very uneven. The eastern extreme of Salomague island in line with the slope of the third knoll on Salomague point, S. 4° W., leads through a channel having a least depth of 7 fathoms. The mark should be closely adhered to.

Plan of Santa Cruz harbour and Masagasai bay on 191.

EAST COAST.—**Tagum point**, $2\frac{1}{2}$ miles south-eastward of the eastern entrance to Santa Cruz harbour is clean and steep-to. It rises in a steep slope to Tagum peaks, two hills 532 and 584 feet in height respectively. From the northward, these hills show quite sharp; the eastern and higher is well defined and wooded, and the inner one is covered with grass, with a fringe of trees at its top.

Salomague island, lying midway between Tagum and Salomague points, and protecting Masagasai bay, is irregular in shape, and about $2\frac{1}{4}$ miles long north-west and south-east. The north-west and south-east points are low, and there are hills in the centre and south-west part, the highest point, 242 feet, being near the centre. On the south-eastern part of the island there is a brown rocky cliff, 120 feet high, visible from seaward. The north-eastern side of the island is fringed with reefs nearly 3 cables wide at the northern end, and tapering off to the rocky cliff just mentioned.

Masagasai bay is a large irregular indentation in the coastline that is nearly filled by Salomague island. The channel between the island and the main is narrow and shoal westward of the centre of the island, but northward and southward expands into basins of considerable size and depth; the southern of these is not recommended. The northern end of the channel offers a safe and fairly roomy anchorage for small vessels, which is easy of access.

To enter, bring a sharp conical hill, 323 feet high, about 2 miles westward from the north end of Salomague island, to bear S. 79° W., when it will be in line with a white stump in the foreground; steer in on this line until Tagum point bears N. 16° E., when steer S. 16° W. until the hill before mentioned bears N. 80° W., and thence by the chart to the anchorage in 4 or 5 fathoms.

Salomague point (*Lat. 13° 22' N., Long. 122° 9' E.*), about 8 miles southward from the eastern entrance point of Santa Cruz harbour, is the most eastern point of Marinduque. It is formed of low cliffs, and is clean and steep-to.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 50' E.

Coast.—From Salomague point the coast trends south-westward with a curve westward for 11 miles to Marlanga point, and then curves round gradually southward and westward to Suban point, the southern extremity of the island. This part of the coast is bold, clean, and steep-to, and in most places the 20-fathoms curve is within a quarter of a mile of the shore. A fringe of coral about 2 cables wide begins westward of Salomague point, whence it gradually decreases in width till it disappears in Marlanga bay.

Torrijos bay, about $4\frac{1}{2}$ miles south-westward of Salomague point, affords shelter for small craft except from southerly and easterly winds. The entrance points and the sides of the bay are fringed with reef, narrowing the entrance channel to about $1\frac{1}{2}$ cables, and contracting the anchorage area to a width of about $1\frac{1}{2}$ cables, with depths of from 4 to 10 fathoms.

Torrijos is a small town of no commercial importance, lying on high ground on the western side of Torrijos bay. The church and one other building have iron roofs, which are visible in most directions from seaward.

Directions.—From about half a mile off-shore bring the right-hand of two native houses at the head of the bay in line with a distant, dark-looking, rounded hill top that shows in a distinct notch in the grassy hills, N. 43° W., and enter cautiously; this line leads to an anchorage in 7 or 8 fathoms, sand, in the centre of the bay.

Marlanga bay, about 4 miles south-westward of Torrijos bay, is $1\frac{1}{2}$ miles wide at the entrance between Kabuyok and Paniki points, and extends three-quarters of a mile north-westward. The bay is too deep to afford anchorage, except in a limited space close to the southern shore, where anchorage may be found in from 12 to 15 fathoms, sand, about 4 cables from the beach.

Marlanga point, the south-eastern point of Marinduque, is a bold, clean headland, which rises to a height of 920 feet within 2 cables from the shore.

Suban point (*Lat. $13^{\circ} 12' N.$, Long. $122^{\circ} 0' E.$*), the southern extremity of the island, is bold and clean; behind the point the land rises rapidly in the direction of Mount Marlanga.

WEST COAST.—**San Andres islets** are two small islets extending about one mile westward from the north-west point of Marinduque. They are each about 130 feet high, and surrounded by a narrow, steep-to reef, dry at low water. There is no channel between them, and the reef connecting them with the shore dries at very low tides.

General charts 2577, 943, 2661b, 1263.

Plan of Port Balanakan on 191.

Antagtakan point, the northern entrance point of Port Balanakan, lying about one mile southward of San Andres islets, is well wooded, and rises to a height of 244 feet.

Pamuntangan point (*Lat. 13° 31' N., Long. 121° 51' E.*), the southern entrance point of Port Balanakan, lies rather more than a mile south-south-westward of Antagtakan point; it is clean, well wooded, and rises to a height of 320 feet. Port Balanakan, situated immediately north-eastward of Pamuntangan point, consists of two small but perfectly-protected anchorages for vessels of moderate size. It is surrounded by high hills, and, except for one reef in the entrance, is free from dangers. The entrance is much contracted by Agpitan, Ataa, and Madumug islands and the reef just mentioned. About midway between the village of Balanakan, which lies on the eastern shore of the outer anchorage, and the entrance to the inner anchorage, there is a yellow bluff, about 25 feet high, which forms a useful mark for vessels entering the port. The inner basin has a clear space of 3 cables in length east and west by one cable in width, with depths of from 6 to 8 fathoms. Its shores are bordered by reefs, and a large shoal, on which is Pangapusan islet, occupies the eastern part of the basin.

Islets and dangers.—Agpitan and Ataa are two islets lying on the same reef, and $1\frac{1}{2}$ cables apart north-east and south-west. They lie on the northern side of the entrance, and Ataa, the southern islet, is $6\frac{1}{2}$ cables northward of Pamuntangan point. They are dome-shaped, about 50 feet high, and wooded at their tops. About half a cable south-westward from Ataa, and near the outer edge of the reef extending from that islet, is a pinnacle rock about 8 feet high.

Madumug islet, on the northern side of the entrance, about 4 cables east-south-eastward from Ataa islet, is small, wooded, and 145 feet high. On the western side there is a light brown cliff, about 90 feet high. The islet is surrounded by reefs, which connect it with the land northward.

Salvaria islet, on the eastern side of the entrance to the inner anchorage, is a pile of rocks with a few trees on it. It is steep-to on its western side, and connected with the land southward and eastward by shoal water.

Reef.—About a quarter of a mile south-westward of Madumug islet is the outer edge of a detached shallow reef with a rock awash on its eastern side; it does not show well. The south-east point of Madumug islet bearing N. 59° E. leads close south-eastward of the reef. The passage between the reef and the southern shore of the port is about 2 cables wide.

General charts 2577, 2661b, 943, 1263.

Plan of Port Balanakan on 191. Var. 0° 50' E.

Directions.—To enter Port Balanakan, pass about $1\frac{1}{2}$ cables northward of Pamuntangan point, and steer East until the yellow bluff previously mentioned bears N. 59° E.; steer for the bluff on this bearing until the west side of Salvaria island is in line with Pig point, N. 18° E.; follow this mark, and anchor off the middle of the eastern side of Madumug islet in 11 fathoms, mud, or continue into the inner basin, passing close westward of Salvaria island, and anchor in 6 or 7 fathoms, mud, south-eastward of Pig point.

Tides.—It is high water, full and change, at Port Balanakan at 11h. 25m., approximate; springs rise about 6 feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—From Pamuntangan point the coast trends south-south-westward about 5 miles to Lupak point, thence 7 miles southward to Kauit point, and then 14 miles south-eastward to Suban point, and is generally clean and steep-to, with no detached dangers with the exception of a patch of $4\frac{3}{4}$ fathoms in the channel between Los Tres Reyes and the main island. On the western side of the island there is more level land than on the eastern, and most of the cultivation and the greater part of the inhabitants are consequently found there. The town of Gazan and the small villages of Laylay, Daiquitin, and Buenavista lie on the coast between Lupak and Suban points. A road from Boak follows the coast, passing through the places just named.

Ulan point, $1\frac{1}{4}$ miles southward of Panumtangan point, is fringed with reef with a greatest width of one-third of a mile; this is the widest reef on the west side of Marinduque. The bay between the two points is nearly blocked with reefs, dry at low water. The low land of the western part of Marinduque ends in this vicinity, and farther northward the hills lie close to the coast.

Lupak point (*Lat. $13^{\circ} 27' N.$, Long. $121^{\circ} 49' E.$*), the western extremity of Marinduque, is low, flat, sandy, and fringed with coconut trees.

Boak, the principal town on the island, lies about $1\frac{1}{2}$ miles from the sea, on the left bank of the Boak river. It is a telegraph station, cables being laid to Romblon and Kalapan, and is connected with Gazan and Torrijos by telephone.

The Boak river divides about one mile from the sea, the main stream flowing westward and discharging just south of Lupak point, while the smaller branch, the Laylay, flows south-westward and discharges half a mile southward of the main entrance. The Boak river is reported to be continually shifting its bed.

Laylay, a small village lying at the south side of the entrance to the Laylay river, is the usual landing place for Boak, with which it is connected by a good road. Boats discharge on the beach in front of Laylay, or enter the river at high water and discharge inside.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Light.—A *red fixed* light, known as Boak light, elevated 28 feet above high water, and visible 7 miles in clear weather, is exhibited from a white concrete tower, 24 feet high, on the beach at the mouth of Laylay river:

Anchorage.—The usual anchorage for Boak is from $2\frac{1}{2}$ to $3\frac{1}{2}$ cables westward of the light, in from 12 to 15 fathoms. This anchorage must be approached with caution, as the water shoals very rapidly; at about three-quarters of a cable within the 20-fathoms line the bottom rises abruptly from 10 to 3 fathoms, after which it shelves gradually to the beach. Steamers call about once in a week or 10 days.

Kauit point is low and sandy.

Gazan.—The town of Gazan is situated on a bluff from 20 to 50 feet above the sea, about 2 miles south-eastward of Kauit point. A conspicuous white warehouse, with an iron roof, is situated near the beach in the northern part of the town. Behind the town is a hill with a ruined fort on it, on one of the walls of which is a conspicuous tree. Copra is the chief article of export from Gazan.

Anchorage.—Good anchorage, protected only during the north-east monsoon, may be found in 7 or 8 fathoms, sand, about 4 cables westward of the town; vessels of light draught may anchor closer in.

Los Tres Reyes are a group of three small, heavily-wooded islands, consisting of Gaspar, 270 feet high, Melchor, 250 feet, and Baltasar, 364 feet, lying in a west-south-west direction, $1\frac{1}{2}$, $3\frac{1}{2}$, and $4\frac{1}{2}$ miles from the south-western part of Marinduque. Their shores are clean and steep-to with the exception of Gaspar, the north-east point of which is fringed with rocks to the distance of about $1\frac{1}{2}$ cables; the chart shows rocks on the east side. Their cliffs are precipitous and underworn by the sea, and are highest on the south-west side of each of the islands, where they rise to a height of about 200 feet. There is no fresh water on the islands, and they are uninhabited.

The channels between the three islands are deep and clear; that between Gaspar and Marinduque has a small coral patch of $4\frac{3}{4}$ fathoms lying near the middle, with the east and west extremes of Gaspar island bearing S. 9° W. and S. 47° W. respectively. The passage westward of the shoal is about three-quarters of a mile wide, with a depth of over 20 fathoms in the middle; the channel between the shoal and Marinduque is nearly half a mile wide and 16 fathoms deep in the middle.

Elefante islet (*Lat. 13° 12' N., Long. 122° 0' E.*), lying about 4 cables southward of Suban point, is a round rocky islet about a quarter of a mile in diameter, over 300 feet high, and thinly wooded; it is clean and steep-to on all sides. It forms a conspicuous landmark

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. when seen from the eastward or westward. The tidal streams between the islet and Marinduque are strong.

Anchorage may be found on a small shelf northward from the islet, in about 13 fathoms, sand, with the eastern side of the islet bearing: S. $1^{\circ} E$.

TIDAL STREAMS.—In the part of the sea between Masbate island and Mindoro the currents are not strong, except off Arena point, the south-eastern extreme of Bondog peninsula, where they acquire some force from the amount of water that enters and leaves the Gulf of Ragay. In Verde island passage the tidal streams reach a velocity of 3 to 4 knots, and the branches which pass on either side of Verde island cause strong eddies at their place of meeting again, and at Escarceo point (northern side of Mindoro) even a partial reversal of the direction of the stream.

The flood streams from the China Sea through Verde island passage, and from the Pacific through San Bernardino strait, meet and neutralise each other nearly on the meridian of Bondog point, or on the line between Bondog point and Romblon island. The ebb streams set in the reverse direction, i.e., from Bondog peninsula outwards, and it has been observed that on coming to Bondog point with a fair tide a reverse stream has been experienced on passing its meridian. The tidal hour of this point has not been determined. For tides at Port Romblon (*Lat. $12^{\circ} 35' N$., Long. $122^{\circ} 16' E$.), see page 339.*

WINDS on the SOUTH COAST of LUZON.—In Tayabas bay and the Gulf of Ragay the land breeze which sets in during the night in both monsoons is generally feeble, but sometimes squally, thereby compelling a sailing vessel to anchor in order to avoid being driven off the coast.

GULF OF RAGAY.—The Gulf of Ragay, included between Point Bondog to the west, and Kadburauan (Panganiran) point, called Cabarian on U.S. chart, to the east, 43 miles apart, runs 65 miles inland to the north-west, and, along with the Viñas river, which enters the gulf at its head, almost severs the island of Luzon in two at this part, separating the provinces of Tayabas and Camarines Norte. The Gulf of Ragay is generally clear and deep. The ports of Pusgo and Guinayan on the west shore, and Pasakao bay on the east shore, are its most frequent anchorages. The entrance of the gulf is divided into two channels by Burias island, with the islands and shoals off its northern end.

WEST SHORE of RAGAY GULF.—The coast between Arena point and Port Pusgo is moderately high and steep-to, with depths of 7 to 14 fathoms off it, except at the part opposite Alibihaban:

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. island, where a reef extends along the shore for 4 miles. Anchorage can be had off the coast generally, but not close in, as there are rocks near the shore; the anchorage is good near the shore between Palad bank and Alibihaban, in a depth of 14 fathoms.

Sombokobon bay, $3\frac{1}{2}$ miles north-north-west of Arena point, is much frequented by native coasters. In the middle of the bay there is a rocky shoal with a narrow channel between it and the shore. The north point of the bay ends in a reef which projects to the south-east and forms a semicircle, offering shelter and anchorage in a depth of $3\frac{1}{2}$ fathoms, fine sand.

Alibihaban island, $3\frac{1}{2}$ miles north-north-east of Sombokobon bay, is $2\frac{1}{2}$ miles long north and south, and three-quarters of a mile wide; it is low, wooded, and surrounded by reef which extends one mile southward and half a mile from the other sides, with irregular soundings near its edges. In the northern part of this reef there is a little bay with a depth of 4 fathoms, and off the southern end there is a small anchorage with 14 fathoms. The channel between the island and the reef on the main coast opposite is $1\frac{1}{4}$ miles wide, and has a depth of 20 fathoms; from the easternmost part of the shore reef, Arena point bears S. 8° E.

Palad bank, 5 miles north of Alibihaban island, is a bank one mile long, on which there is a sandy cay, 10 feet above water, and surrounded by rocks. It can be seen in daylight from a good distance, and at a sufficient distance to avoid it on a clear night. The channel between the bank and the main coast is 2 miles wide, and carries a depth of 9 fathoms.

Plan of Port Pusgo on 2395.

Port Pusgo (*Lat. $13^{\circ} 31' N.$, Long. $122^{\circ} 36' E.$*) is a narrow inlet which penetrates 5 miles to the north-west. The width between the outer entrance points is $1\frac{3}{4}$ miles, but the navigable space is considerably reduced by shoals extending along the main shore on both sides, and half-way up the inlet the width is only one cable. The depth in mid-channel is 4 to 7 fathoms from the entrance to as far as half a mile past the narrowest part, but in the inner harbour generally it is less than 2 fathoms. The town of San Narciso stands at the head of the inlet.

Shoal.—In the middle of the entrance, at the distance of $1\frac{1}{4}$ miles S. 25° E. of Pusgo point, there is a rocky bank $1\frac{1}{2}$ cables in extent covered by $1\frac{3}{4}$ fathoms of water.

Chart 2577, Between San Bernardino and Mindoro straits.

Gorda point lies $1\frac{1}{4}$ miles northward of Pusgo point, and is high and steep, with a flat crown.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

The reef which, from the interior of Port Pusgo, fringes the coast continues round Gorda point to the north-west, at a distance of 2 to 4 cables from the shore. A shoal, covered by $1\frac{3}{4}$ fathoms water, lies nearly 5 miles north-west of Gorda point, and one mile from the shore.

Peris bay (*Lat. 13° 43' N., Long. 122° 29' E.*), 13 miles north-westward of Gorda point, is bordered by a broad shoal of mud covered by $1\frac{3}{4}$ fathoms water, which considerably reduces the available space; anchorage can be had in the north-west part of the bay, in a depth of $5\frac{1}{2}$ fathoms. Lian point, the northern point of the bay, is of moderate height, and skirted by a reef which projects seaward half a mile.

Kapuluan point, 5 miles north of Lian point, is surrounded by the reef which borders the coast for 3 miles to the southward, and which extends one mile eastward of the point, with detached rocks awash. Kapuluan rocks, $2\frac{1}{4}$ miles east of the point of the same name, form a shoal one-third of a mile in extent, on which there are several rocks awash, with depths of $4\frac{1}{2}$ to 14 fathoms around them.

The channel between the rocks and the point is one mile wide, and is reported to be shoal in places. Vessels bound to Guinayan should keep on the eastern side of the gulf until well past Kapuluan point.

Guinayan.—There is anchorage off the town of Guinayan, situated at the head of Ragay gulf, 6 miles north-westward from Kapuluan point, in a depth of 4 fathoms, mud, with a white-roofed house bearing W.N.W. The reef does not extend as far from the shore southward of the town as is shown on the chart; a depth of 3 fathoms was found at a quarter of a mile from the shore.

Telegraph.—There is a telegraph station at Guinayan. The cable from Pasakao is landed here.

Acha shoal, 5 miles N. by W. of Kapuluan point, is a rocky shoal 2 cables long north and south, covered by $1\frac{1}{2}$ fathoms water, with 6 and 7 fathoms around. The Spanish Derrotero says that there is only one fathom on this shoal, although the chart shows $1\frac{1}{2}$ fathoms. It lies $2\frac{3}{4}$ miles from the coast to the westward, and $1\frac{1}{4}$ miles from Sipalon island, a low peaked island separated from the reef of the north shore.

Kabibijaban or **Viñas river**, which enters the gulf at the extreme head of it, is shallow, the depth at the mouth being $5\frac{1}{2}$ feet.

EAST SHORE of RAGAY GULF.—**Point Kadburauan** (Cabarian) or **Panganiran** is low, wooded, and surrounded by rocks to a short distance, with a depth of $4\frac{1}{2}$ fathoms near them. Mount Kadburauan is situated 4 miles northward of it.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Makoto point (*Lat. 13° 4' N., Long. 123° 17' E.*), $4\frac{1}{2}$ miles north-north-westward of Kadburauan point, is of moderate height, steep, with a flat crown, and is surrounded by a reef. A rocky shoal, half a mile in diameter, and covered by $3\frac{1}{2}$ fathoms, lies one mile north-west of the point. This shoal may generally be distinguished by the green and white colour of the water above it. There is an islet south-east of the point, united to it by a reef.

The bay to the south-eastward of Makoto point offers anchorage sheltered from the north and west. Care must be taken in entering it to avoid a reef which projects from Badian point, the south point of the bay.

Apud shoal is a rocky shoal, about a mile broad, which uncovers in parts at low water, and extends from half a mile to $2\frac{1}{2}$ miles north-north-west from Apud point.

Coast.—From Makoto point to Pasakao anchorage the coast is high, generally steep-to, and bordered by sand beaches between the intermediate points. A shoal surrounds Kauanhahan point to a distance of one cable, and there is also one to the eastward, off the town of Pantao. At $4\frac{1}{2}$ miles northward of Kauanhahan point a reef begins, and borders the shore for a distance of 4 miles to the north-westward, with a width of half a mile.

Anchorage may be had in the elbow which the coast makes at the town of Pantao, north of Kauanhahan point; in Jamuaraon bay, north of the point of the same name, in a depth of 6 fathoms; and very close to the shore north of Sibono point, 6 miles south-eastward of Pasakao.

Plan of Pasakao anchorage on 2395.

Pasakao anchorage is situated between two flat-topped hills, the westernmost of which terminates in a mangrove-covered point, off which, at $1\frac{1}{2}$ cables distance, the depths are $6\frac{1}{2}$ and 8 fathoms. The 10-fathoms line is distant from a half to three-quarters of a mile from the north shore of the anchorage, and the depths decrease gradually towards the land.

Anchorage may be taken according to draught, in from 2 to 10 fathoms, with the large conspicuous warehouse bearing N.N.W. When anchoring, care must be taken to avoid the telegraph cable from Guinayan in the western part of the anchorage.

Refugio islet, 200 feet high, has a sharp peak with yellow top, and is a good mark for making the place; it is surrounded by a narrow reef, steep-to, with deep water close southward. It lies on the eastern side of the anchorage, $1\frac{1}{4}$ miles from the western point, and half a mile from the shore abreast of it. The channel between the islet and the coast has several rocky shoals in it, and should not be used.

General charts 2577, 943, 1263.

Plan of Pasakao anchorage on 2395. Var. 0° 50' E.

Steamers call here fortnightly.

Telegraph.—Pasakao (*Lat. 13° 30' N., Long. 123° 3' E.*) is a telegraph station, and is connected with Guinayan by cable.

Tide.—It is high water, full and change, at Pasakao anchorage at 11h.; springs rise 4 feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—From Pasakao anchorage the coast trends west-north-west for 4 miles, and is high and fronted by sand beaches as far as Tanuan point, which is steep, with a flat crown. Thence the coast trends north-westward for 13 miles to Galvaney point, and is mountainous and bold. About midway between the two latter points is the Tinagbud river, off the mouth of which anchorage may be had in 4 fathoms. A sharp peaked rock lies 2 cables from Buri point, south of Tinagbud.

Galvaney or Bantuin point is high, with a peculiarly-shaped sharp peak near its end, steep to seaward; it is connected with the mainland by a narrow neck of low land, and appears as an island at a distance. The two islets Galvaney are respectively half a mile and one mile north-west of the point. The channel between the islets is foul, as is also that between them and the point.

Kaima bay, included between Galvaney point and Sabun island, $8\frac{1}{2}$ miles to the north-west, is bordered by reef. There is anchorage near this reef off the town of Bangon in a depth of 8 to 12 fathoms, and also in places nearer Galvaney point in 7 fathoms.

Ragay bay, between Omon point to the north and Oktok point and Sabun island to the south, affords good anchorage, sheltered in both monsoons, in depths of $4\frac{1}{2}$ to 17 fathoms, mud. The shore at the head of the bay is low and swampy, and low scrub trees grow out into the water. The river is only navigable for small boats at low water. The town is not visible when entering the bay, but the mouth of the river can be made out when $1\frac{1}{2}$ miles off. Sabun island, one mile long east and west, is almost united to Oktok point at low water; its northern side is steep-to, but a reef projects one mile to seaward from the western point. The southern shore is foul.

When entering Ragay bay, give the west end of Sabun island a good berth, as the reef off it appears to extend farther than is shown on the chart.

Telegraph.—There is a telegraph station at the town of Ragay at the head of the bay.

Katabanga bay, $3\frac{1}{2}$ miles north-west of Ragay bay, is nearly 4 miles wide between Bagutayok and Guilbay points, and is lined with rocks. The depth towards the northern part is 11 fathoms. There is

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. anchorage in the eastern part of the bay, near the little river Katabanga, in about 8 fathoms.

Talkauayan bay (*Lat. $13^{\circ} 56' N.$, Long. $122^{\circ} 32' E.$*), 3 miles north-westward of Katabanga bay, is $1\frac{1}{2}$ miles wide at the entrance, and extends $2\frac{1}{2}$ miles to the northward; the depth of water in it gradually decreases from 7 fathoms at the mouth to 3 fathoms at the head.

Tides and tidal streams.—In the Gulf of Ragay the flood stream sets to the north, and the ebb to the south. The range of tides at springs is $5\frac{1}{2}$ feet.

BURIAS ISLAND, at the entrance of the Gulf of Ragay, is 37 miles long north-west and south-east, and about 8 miles wide at the northern end, tapering to less than 2 miles at its south-eastern part; it is roughly mountainous, and thinly wooded. Mount Engañosá, the highest point on the island, is situated 12 miles from its south point, and divides the high land of the northern part of the island from the very low land of the southern part, on which, however, 3 miles from the south extreme, rises Mount Sagurun, 853 feet in height. The coast is in general steep, and bordered in places by sand beaches. The island has two sheltered ports: Busin, at the north-west end, formed by Busin island lying in front of a bay in the mainland, and Busainga, on the north-east coast of the island.

Burias island and the islets and reefs in its vicinity have not yet been thoroughly surveyed. The population is small, and the main productions are rice and hemp.

Islets and dangers.—There are several small islets and reefs off the northern part: Templo, $2\frac{1}{2}$ miles north-west of Cueva point, the north-west point of Burias, is 3 miles long north-west and south-east, and $1\frac{1}{2}$ miles wide. There are detached rocks on its south side, and its north point is surrounded by a reef half a mile in width.

Sombrero, $1\frac{1}{2}$ miles west of the south part of Templo, consists of two islets close together on a reef which extends a mile to the north-west and south-east of them.

Arena islet, 7 miles south-eastward of Arena point, on Bondog peninsula, is surrounded by a reef which extends three-quarters of a mile to the northward. A shoal, separated from this last-named islet by a channel three-quarters of a mile wide and 12 fathoms deep, lies $1\frac{1}{2}$ miles to the north of it.

Busin island is $2\frac{1}{4}$ miles long and one mile wide. A shoal projects from its north-west end to the Tinalisayan islets, and 4 miles north of Cueva point is the little island Tanguingui.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Detached shoals.—One mile north-north-eastward of Tanguin-gui there is a rocky head covered by $3\frac{3}{4}$ fathoms, with a depth of 71 fathoms immediately north of it; and about $2\frac{1}{4}$ miles north of the extreme northern point of Burias there is a rocky shoal half a mile in extent, having less than a fathom over it.

Anima Sola is an islet $4\frac{1}{2}$ miles N. 40° E. from the north point of Burias, surrounded by rocks.

Plan of Port Busin on 2395.

Port Busin (*Lat. $13^\circ 8' N.$, Long. $122^\circ 58' E.$*) is formed by the channel $3\frac{1}{2}$ miles long and $1\frac{1}{2}$ cables wide that separates Busin island from Burias. The western entrance of this channel is narrow and tortuous, and very dangerous for a sailing vessel; the northern entrance is preferable, as, though narrow, it is more direct, and its sides are steep-to with a depth of 12 fathoms in the middle. The northern entrance may be easily recognised by Colorada point, the north cape of Burias, which is higher than Busin island, and shows yellow patches among the trees that cover it. The part of the coast also near the entrance may be recognised by the massive bluffs about it.

Anchorage.—The best anchorage is west of Fort San Pascual, at the entrance of the bay that opens to the south, on the coast of Burias, with the eastern end of Busin island bearing N. 27° E., and the south side of the small islet southward of Busin S. 69° W., in about 11 fathoms, mud. Small vessels could go farther into the bay towards the village. The depth of the entrance of this bay is 11 fathoms, lessening to $3\frac{1}{2}$ fathoms at half a mile within the bay.

Fresh water can be obtained here.

Directions.—To enter, round Colorada point at the distance of a quarter of a mile and steer down in mid-channel between Burias and Busin islands to the anchorage.

Tides.—It is high water, full and change, at Port Busin, at 1h. 34m.; springs rise $4\frac{3}{4}$ feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—Between Port Busin and Port Busainga, distant 4 miles to the south-east, the coast forms a bay, from the eastern point of which a reef projects to the northward for one mile, with a depth of 9 fathoms near its northern edge; the reef narrows in to the coast again at the northern point of Port Busainga.

Plan of Port Busainga on 2395.

Port Busainga is an inlet $1\frac{1}{2}$ miles long in a south-west direction, and one cable wide in its narrowest part, which affords good

General charts 2577, 943, 1263.

Plan of Port Busainga on 2395. Var. 0° 50' E.

shelter from wind and sea. The space, one mile wide, at the bottom of the port is mostly shallow.

The Boca islets lie about one-third of a mile north-eastward from Piedras point, on the western side of the entrance; the bottom is foul between them and the shore.

Directions.—To enter, bring Piedras point to bear S. 89° W., and steer for it; pass about half a cable from the point, and enter the port, keeping in about mid-channel, and anchor when the centre of Medio island bears West and North point, at the north end of the island north-east of Medio island, N. 27° E., in 10 to 11 fathoms, good holding ground.

Tides.—It is high water, full and change, at Port Busainga, at 1h. 29m.; springs rise 5 feet

Chart 2577, Between San Bernardino and Mindoro straits.

East coast of Burias.—The bay, 2 miles wide, 5 miles south-eastward of Port Busainga, appears to be filled with shoals; the remainder of the coast to the southward presents beaches off which there is anchorage on the open coast.

Plan of Port Boca Engaño on 2395.

Port Boca Engaño is situated 7 miles from the south-eastern extreme of Burias island. It is an inlet half a mile wide at the entrance, and one mile deep. There is a large bank, nearly dry at low water, in the centre of the entrance, and the head of the inlet is shoal, reducing the available anchorage space to a very small area. A small vessel could find good anchorage southward of the shoal in the entrance. The anchorage depths are from 5 to 16 fathoms.

Directions.—To enter, steer down the western shore, which is bold, and anchor with the western entrance point bearing N. 33° W., and the eastern entrance point N. 36° E., in about 15 fathoms, sand and rock. The passage westward of the bank in the centre of the entrance is deep, straight, and a little more than a cable wide; that eastward of the bank is narrower, not so direct, and has $5\frac{3}{4}$ fathoms in the entrance.

Chart 3369, Luzon island to Masbate island.

Aguja (South) point (Lat. 12° 42' N., Long. 123° 23' E.).—The south-eastern part of Burias island from Mount Sagurun (page 478), slopes gradually to the sea, terminating in Aguja point, which is bold and clear of danger.

Chart 2577, Between San Bernardino and Mindoro straits.

West coast of Burias.—Cueva point, the north-west extreme of the island, is surrounded by a shoal 2 cables wide, from which a reef

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. extends to Guinduyan point, 6 miles to the southward, advancing in some places to a mile from the coast. The remainder of the west coast is sandy, with shoals at no great distance from it, especially in the bight of the coast called Boca Engaños (false entrance) at the foot of the slope of Mount Engaños, which is the highest elevation in the island, and the only good landmark at night along this coast. Gorrion islet (*Lat. $12^{\circ} 49' N.$, Long. $123^{\circ} 15' E.$*) lies off the south-eastern point of this bight, about $1\frac{3}{4}$ miles southward of Mount Engaños. The reef around Gorrion islet extends along the coast to the south-east for $3\frac{1}{2}$ miles, and is nearly a mile wide in places.

Shoal.—A shoal was reported in 1900 to exist at a distance of $4\frac{1}{2}$ miles W. by N. from Gorrion islet; the depth over it is uncertain, but it is shown on the charts as a rock having less than 6 feet water. Its position is doubtful.

Caution.—When approaching Burias island from the westward in thick weather, such as occurs in the south-west monsoon, the southern part of the island, which is comparatively low, may be hidden, and the slope of Mount Engaños may be mistaken for the end of the island, and Boca Engaños for the passage between Burias and Masbate, a mistake which has caused the loss of several vessels, and has given rise to the name of “False.” Mount Sagurun, 853 feet in height, situated 9 miles south-east of Mount Engaños, and 3 miles within the south point of Burias, forms, however, a prominent feature at the south end of this island.

SOUTH COAST of LUZON.—From Kadburauan point the coast trends east-north-east for 6 miles, and is foul for $3\frac{1}{2}$ miles; Solitario islet, distant half a mile from the coast, is united to it by a reef which dries at low water. The coast then bends round to the south-east, forming Panganiran bay, and becomes lower towards Marigondon point, which is rocky and steep-to with a flat top. There is anchorage between Marigondon point and the town of the same name to the northward, off which the depth is 7 fathoms. From this point the coast trends south-eastward 8 miles to Katundulan point, which is surrounded by a reef extending a quarter of a mile southward of the point.

Chart 3368, Batan I. to San Bernardino I., &c.

Himagaan bay lies on the eastern side of Katundulan point; it is 2 miles wide, and recedes one mile northward. Shoal water extends from 3 to 4 cables from the shores of the bay, beyond which the depths increase from $3\frac{3}{4}$ fathoms to 9 fathoms in the centre of the entrance. The western and north-western shores are bordered by a reef from one to 2 cables wide.

General charts 2577, 943, 1263.

Chart 3368, Batan I. to San Bernardino I., &c. Var. 0° 50' E.

The coast then continues south-eastward to Dumaquit point, distant $8\frac{1}{4}$ miles from Katundulan point; about half-way between the two points is the mouth of the Donsol river.

Donsol river and town.—Donsol river has a depth of 3 feet on the bar; the mouth of the river is fronted by wide sandbanks, which extend seaward three-quarters of a mile, with depths of 13 fathoms outside the edge. Inside the bar the depths are 5 to 11 feet for a mile up the river.

Light (*Lat. 12° 54' N., Long. 123° 36' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited at an elevation of 36 feet above high water from a white frame structure, 33 feet high, erected on the eastern bank of the Donsol river, in the extreme western part of the town of Donsol. For arc of visibility, *see* Light list.

Anchorage.—There is anchorage in 9 fathoms about 8 cables S. 7° W. from the light.

The town of Donsol, on the left bank of the river, near its mouth, carries on a trade with Manila in hemp. Supplies, such as poultry, eggs, vegetables, and a few cattle may be obtained. Steamers call about fortnightly.

Four miles east-south-eastward of Donsol river is Dumaquit point, and a rocky patch of $4\frac{3}{4}$ fathoms lies a long mile south-south-west of the point; between the river and the point shoal water extends off the coast for a distance varying from 6 cables at the western part to a quarter of a mile.

Port Putiao (Port Pilar), eastward of Dumaquit point, is a large but shallow inlet, which can be entered by coasters only, and at high water; the entrance, between Dumaquit and Kutkut points, is $2\frac{1}{2}$ miles wide, and the inlet extends about 3 miles northward. At about half a mile within the entrance, sandbanks extending from both sides reduce the navigable space to a narrow channel, with a depth of $1\frac{1}{4}$ fathoms. The northern part of the inlet is all shoal, but the depths increase at the mouth of the Putiao river in the north-eastern corner, where in the vicinity of Porvenir village they are from $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms. There is a jetty at Pilar, north side of the port. Dumaquit and Kutkut points are fringed with reefs.

Tides.—It is high water, full and change, at 11h. 30m.; springs rise 9 feet.

Port Panlatuan, to the eastward of Port Putiao, is nearly filled with banks and reefs. The entrance is about $2\frac{1}{2}$ miles wide between Kutkut and Bantiki points, but about one mile northward the port narrows to a quarter of a mile in width between Panlatuan and Dapdap

General charts 2577, 943, 1263.

Chart 3368, Batan I. to San Bernardino I., &c. Var. 0° 50' E.

points, and then widens out, forming a shallow lagoon of irregular shape about $2\frac{1}{2}$ miles in length east and west.

Southward of Dapdap point reefs and shoal water extend $1\frac{1}{2}$ miles from the eastern shore, and shoal water extends a quarter of a mile from the western side.

Shoal water extends two-thirds of a mile southward of Kutkut point, and near its extremity, at half a mile from the point, is a pinnacle rock awash at low water.

Depths.—The depth in the entrance is $1\frac{1}{2}$ fathoms, and in the narrows between Panlatuan and Dapdap points $4\frac{1}{4}$ fathoms.

Bantiki point (*Lat. 12° 51' N., Long. 123° 44' E.*), the western point of the large port of Sorsogon, is rounded, low, rocky, and wooded, with a shore composed of gravel and clayey cliffs. The coast reef that surrounds the point is narrow, except on the side of Port Panlatuan, but shoal ground extends one-third of a mile southward from it.

Reef.—A coral reef, with $1\frac{1}{4}$ fathoms over it, the position of which is doubtful, is reported to lie $1\frac{1}{4}$ miles south-westward of the centre of Bantiki point; vessels should give Bantiki point a wide berth in passing.

PORT SORSOGON is the largest and best harbour in southern Luzon, and is a good refuge in case of a typhoon or a *colla*, and for effecting repairs. The entrance is divided into three channels by the islands Malumahuan and Bagatao. The channel between these two islands is the only one practicable for vessels, the others between the islands and the coast being narrow and shoal.

Depths.—The depths in the entrance are irregular, being from 9 to 24 fathoms, and from 12 fathoms abreast Makugil point they decrease gradually to the head of the port, at the distance of $4\frac{1}{2}$ miles from which the depth is 3 fathoms, soft mud.

Malumahuan island, lying one mile from the shore on the eastern side of Bantiki point, and forming the western side of the main entrance to Port Sorsogon, is three-quarters of a mile long north and south, and about a quarter of a mile wide. It is nearly connected with the mainland by a narrow shoal, and a rocky shoal extends three-quarters of a mile southward and $1\frac{1}{4}$ miles south-westward from the island. The bottom eastward of the island shelves gradually, with a depth of 4 fathoms about 3 cables from the shore, but at three-quarters of a mile eastward and north-eastward from the north point of the island the depth is 3 fathoms.

General charts 2577, 943, 1263.

Chart 3368, Batan I. to San Bernardino I., &c. Var. 0° 50' E.

Buoy.—A black can buoy is moored in 5 fathoms about one mile southward of the south end of Malumahuan, and marks the western edge of the main channel into Port Sorsogon.

Bagatao island (San Diego island), forming the eastern side of the main entrance, is $2\frac{1}{2}$ miles long, east and west, three-quarters of a mile wide, of moderate height, and wooded. The eastern end rises to a height of 426 feet. The shores of the western part of the island are clean.

A bank of fine black sand, with a depth over it of 10 to 16 fathoms, stretches 3 miles south-west of Bagatao island, and offers anchorage to vessels caught by bad weather and unable to reach the port.

LIGHTS (*Lat. 12° 50' N., Long. 123° 48' E.*).—A *white flashing light every second*, visible 18 miles in clear weather, is exhibited at an elevation of 135 feet above high water, from a white cylindrical iron tower 29 feet high, with dwelling at its base, erected on the south-western extreme of Bagatao island. It is visible seaward over an arc of 130°. See view *a*, at page 488.

A *red fixed light*, visible 6 miles in clear weather, is exhibited, at an elevation of 43 feet above high water, from a white post situated on Arenas point, the western extreme of Bagatao island, about a quarter of a mile northward of the above light.

The Boca Grande, or principal entrance, is $1\frac{1}{2}$ miles wide between Malumahuan and Bagatao islands, whence the channel is nearly 6 miles long N.E. by E., with irregular depths of 9 to 20 fathoms in the middle as far as Makugil point, on the southern shore. The coast and islets on the north-west side of the channel are clean, and the islets are steep-to. The indentations on the south-east side of the channel, eastward of a line drawn from Tinakos islet to Makugil point, are shoal. Tinakos islet, about one-third of a mile northward of the western end of Bagatao, lies at the edge of the shoal water extending north-westward from Magallanes, and has rocks extending 2 cables from its west end.

Magallanes rock, a pinnacle with one fathom on it, lies $1\frac{1}{2}$ cables North from Makugil point. Another pinnacle rock with the same depth on it lies $2\frac{1}{2}$ cables N. by W. $\frac{1}{2}$ W. from the point.

The inner port of Sorsogon is spacious, extending 10 miles eastward and $4\frac{1}{2}$ to $7\frac{1}{2}$ miles north and south, with depths over soft mud diminishing gradually from 12 fathoms at the western end to $1\frac{1}{2}$ fathoms off the town of Sorsogon and thence to the mudbanks, dry at low water, which extend from the shores two-thirds of a mile in places.

General charts 2577, 943, 1263.

Chart 3368, Batan I. to San Bernardino I., &c. Var. 0° 50' E.

Anchorage.—Once past Bagatao island a vessel can choose the anchorage suitable to her draught; a depth of $3\frac{1}{2}$ fathoms is reached at $4\frac{1}{2}$ miles and $2\frac{1}{2}$ fathoms at $1\frac{1}{2}$ miles south-westward from the town of Sorsogon. There is sheltered anchorage anywhere in the port, but a good place appears to be north of Bagatao island abreast a small stretch of sandy shore, and immediately westward of Tinakos islet. Anchorage may also be taken southward of Bagatao in fine weather or with off-shore winds.

Directions.—Vessels approaching Port Sorsogon from the westward should keep Mount Kadburaan open southward of Katundulan point, until the western end of Bagatao island is in line with the eastern point of Lavampa islet, N. 50° E., when they may be steered for. In entering, a vessel in mid-channel is clear of all danger. Give the west end of Bagatao island a berth of half a mile, and continue northward until the north side of Bagatao is abeam, when steer N. 63° E. for Makugil point until Lavampa islet is abeam on the port hand, distant $3\frac{1}{2}$ or 4 cables; then steer N. 37° E. until Makugil point bears South, when alter course to N. 65° E., with Sorsogon town a little on the port bow, and anchor according to the vessel's draught.

Magallanes is a port situated on a point of the mainland abreast the eastern end of Bagatao island. There is a narrow, deep channel leading to it from the northward, and it is reported that there is a good channel with not less than 15 feet at high water leading southward.

Sorsogon (*Lat. $12^{\circ} 58' N.$, Long. $124^{\circ} 1' E.$*).—The town of Sorsogon, with a population in 1903 of 13,511, lies on the north shore near the head of the port, and is an important hemp centre.

The water off it is shoal, as previously mentioned, and all cargo has to be lightered. There are two dilapidated wharves, which dry at low water. Lighters are plentiful, but principally belong to the present owners of steamers.

Telegraph.—Buoy.—Sorsogon is a telegraph station; it is connected with Palanog in Masbate by cable, and with Manila by cable and land wire.

A cable-mark buoy, showing the position of the Sorsogon-Masbate cable, is moored on the northern side of the port, well out of the track of navigation.

Supplies.—There are many towns on the shores of Port Sorsogon, of which Sorsogon, the capital of Sorsogon province, Kasiguran, and Castilla are the most important in the order named, and beef, poultry, rice, and vegetables are all procurable. Water is to be had on the eastern side of the harbour, and from the River Geladiok, opposite

General charts 2577, 943, 1263.

Chart 3368, Batan I. to San Bernardino I., &c. Var. 0° 50' E.

Tinakos islet, also at Samban well in the north-western part of the port. Steamers from Manila visit the port about twice a fortnight.

Chart 3370, San Bernardino strait and approaches.

Coast.—From Magallanes, at the entrance to Port Sorsogon, the coast trends southward for $10\frac{1}{2}$ miles to Bulak point, and shows broken ground in some places, though in general the shore shelves gradually into the sea by sandy beaches, before which vessels can find good anchorage. All this coast shelves out, with depths of 10 fathoms at the distance of 2 miles to one mile as far as Inararan point, beyond which the deep water approaches nearer the shore. At two-thirds of a mile off Inararan point, about 8 miles southward of Bagatao island, the depth is one fathom.

Bulan (*Lat. 12° 40' N., Long. 123° 52' E.*).—The town of Bulan is situated on the right bank of the Sabang river, which debouches south of Bulak point. Coasting steamers call here regularly.

The most conspicuous object is the steeple of the church, which, if steered for on an E. by N. $\frac{1}{2}$ N. bearing, will lead to a safe anchorage in 6 or 7 fathoms, about half a mile from the shore.

LIGHT.—A *red fixed* light, visible 9 miles in clear weather, is exhibited, at an elevation of 38 feet above high water, from a white wooden framework tower, 35 feet high, erected behind the beach at the town of Bulan. For arc of visibility, *see* Light list and charts.

Agnas point, $3\frac{1}{2}$ miles south-east of Bulak point, is high, bare, and bold; Utabe bay, westward of the point, shows a sandy beach outside a quarter of a mile from which the depths are 3 to 10 fathoms. Shoal water extends half a mile from the shore off the mouth of the Tugbugun river, on the north side of the bay, $2\frac{1}{4}$ miles north-west of Agnas point.

Butag bay, east of Agnas point, is about three-quarters of a mile wide, and extends the same distance northward; reefs fringe the shores, and shoal water extends one-third of a mile from the head of the bay, decreasing in width to the east entrance point. The shores are wooded and in some places of considerable height. The depth of water in the middle of the bay is $5\frac{1}{4}$ to 13 fathoms.

Anchorage.—Good anchorage, protected during the north-east monsoon, may be had in the middle of the bay in 10 fathoms, mud, with Agnas point bearing about W. by S.

Marinap bay, the second small bay south-eastward of Butag, lies southward of Burubog point, and is capable of containing vessels of light draught. The shores are sandy in some places, and covered

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. $0^{\circ} 50'$ E.

with mangroves in others. The depth in the bay is $3\frac{3}{4}$ fathoms, and in the entrance is a patch of $2\frac{3}{4}$ fathoms.

Between the southern point of Marinap bay and Tagiran point the coast is slightly indented with little bays clean and deep, but not running far inland and offering little shelter; the water is deep near the intermediate points, and at 2 cables from the head of the bays.

Tagiran point (*Lat. $12^{\circ} 33'$ N., Long. $123^{\circ} 58'$ E.*), 5 miles south-east from Agnas point, is a remarkable little hill, 49 feet high, apart from a high mountain range behind it, with a flat top on which is a plot of green clearer than the rest of the hill, and which can be seen at some distance. There are three or four detached rocks about 40 yards from the point with a depth of 5 fathoms close to them, and 10 fathoms at a short distance. A rivulet falls into the sandy creek on the east side of the point.

Tidal streams.—In the channel between this coast and Tikao island the tidal streams run with a velocity of not less than 4 knots.

Chart 3369, Luzon island to Masbate island.

TIKAO ISLAND is $23\frac{1}{2}$ miles long north-north-west and south-south-east, and nearly 7 miles across at its widest part, 7 miles from the northern end, narrowing towards the south point, San Rafael, from which a chain of islets and rocks extend toward Vigia point in Masbate. The island is mountainous, and but thinly populated. It possesses two ports, San Miguel and San Jacinto, neither of them very good.

The east coast of Tikao presents many little bays open to the east, in which anchorage can be had, as well as on the sandbank that borders the coast, and which extends out about a mile from Biton bay to San Rafael point. The west coast is steep and rugged, and has no good anchorage; a depth of $5\frac{1}{2}$ to 7 fathoms is found along the entire coast at a short distance from it. Tatus islet, 50 feet high, lies half a mile west of San Rafael point.

Port San Miguel, at the north end of Tikao island, is one mile wide at the entrance, and open to the north-west; Katpatin island forms the western side of the entrance. The port enters the land for about 2 miles, but the available anchorage space is very limited, as the depth generally is from 20 to 50 fathoms even close up to the steep shores, except at the south-west part of the port, which is almost entirely occupied by a large bank. Near the middle of the bank are the three small Puro islets, with a depth of 3 feet between them; from the outermost islet the shoal flat extends northward and eastward to the distance of 4 cables, and upon it small craft may find anchorage in a depth of $2\frac{3}{4}$ fathoms. The southern part of the bay is fringed by

General charts 2577, 943, 1263.

Chart 3369, Luzon island to Masbate island. Var. 1° 0' E.

a reef. This port offers anchorage in thick or bad weather, or to a vessel embayed under Bagababoy islands and unable to reach Port San Jacinto or the anchorages off Masbate.

The three islands, San Miguel, Bagababoy, and a small one lying between them, which form a prolongation of the north end of Tikao, are very steep-to, but must be given a good berth, as the tidal streams are liable to set vessels upon them.

LIGHT.—**San Miguel island** (*Lat. 12° 43' N., Long. 123° 35' E.*).—A *white occulting light every fourteen seconds*, thus:—light, *ten seconds*; eclipse, *four seconds*, visible 15 miles, in clear weather, is exhibited, at an elevation of 295 feet above high water, from a concrete tower, 35 feet high, situated on the north-west extreme of San Miguel island. For arc of visibility, *see* Light list and charts.

A reef, with depths of 5 to 8 fathoms, is reported to exist eastward of San Miguel island, with Aguja point, Burias island, visible between San Miguel island and the small unnamed island southward of it, bearing S. 85° W., and the south-east point of Bagababoy island S. 12° E.

Taguan (Taklogan) bay, 7 miles south-east of Nunan point, the northern extreme of Tikao, is open to the north-east, and is skirted by a narrow reef which continues along the coast 2 miles to the north-west, and also to Port San Jacinto, 3 miles south-south-east.

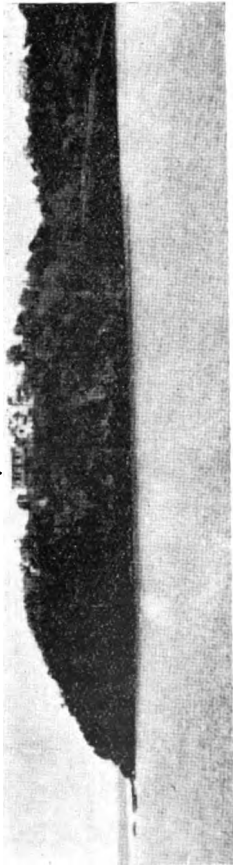
Plan of San Jacinto on 970.

Port San Jacinto is small, and open to the east, but has good holding ground; the entrance may be recognised by a fort with rounded bastions on the southern point, with some conical hills, about 330 feet high, behind it. The narrow bank that fringes the coast continues round the inside of the port, almost filling up the north-west part of it; and the 5-fathoms contour line passes within 3 cables of San Antonio, the northern point, and within nearly 2 cables of San José, the southern point, reducing the actual width of the available harbour to about 2 cables. The depth of water lessens gradually from 16 fathoms at the entrance to 3 fathoms, mud, at the edge of the shoal of sand and mud at the bottom of the port. The town is on the point near the fort.

Light.—A *red fixed light*, visible 7 miles in clear weather, is exhibited, at an elevation of 55 feet above high water, from a concrete house, 14 feet high, situated on San José point, south side of entrance to Port San Jacinto. For arc of visibility, *see* Light list and plan.

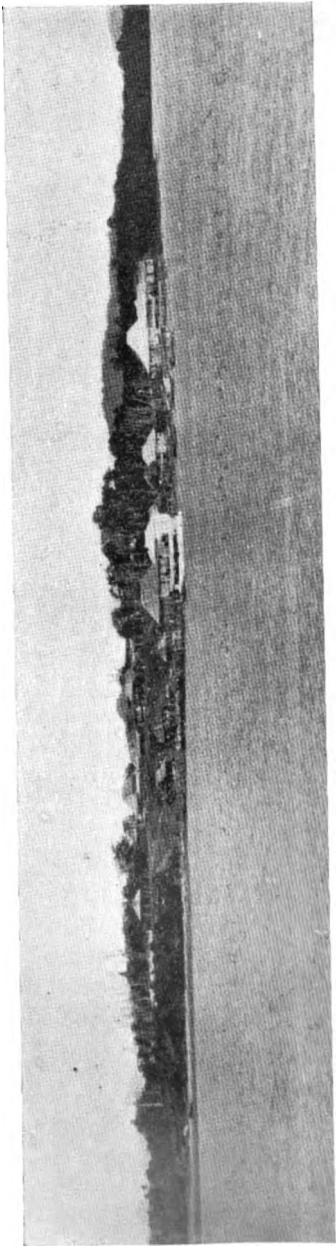
Anchorage.—The best anchorage is on the southern side of the port, in a depth of 9 fathoms, with San Cosme point bearing N. 19° E.,

General charts 3369, 2577, 943, 1263.



(a)

Bagatao Island Lighthouse.



(b)

Masbate Town, Port Palanog.

Plan of San Jacinto on 970. Var. 1° 0' E.

and San José point S. 74° E. Better sheltered anchorage for small vessels will be found in 4 fathoms, westward of San Cosme point.

Water can be obtained at the wells, and also at a river near.

Tides.—It is high water, full and change, at 6h. 30m.; springs rise 6 feet. The tidal stream is very weak.

Chart 3369, Luzon island to Masbate island, &c.

Tikao bay is situated $5\frac{1}{2}$ miles southward of Port San Jacinto, and is open eastward. The town of San Fernando is on the western shore of the bay. The depths one mile east of the town are 27 and 32 fathoms, decreasing gradually to $3\frac{1}{4}$ fathoms, mud, at the head of the bay.

Coast.—From Tikao bay the coast trends southward for about $8\frac{1}{2}$ miles to San Rafael point (*Lat. 12° 20' N., Long. 123° 47' E.*); between are two shoal bays, Batoan and Biton, about 2 miles apart, the latter situated $2\frac{1}{4}$ miles northward of San Rafael point. The coast for 7 miles is bordered by a reef and shoal water, extending from 2 to 4 cables off, with openings abreast the bays mentioned, where anchorage may be obtained in a moderate depth of water. The coast between Biton bay and San Rafael point is also fringed with reef, which narrows gradually southward, ending near the point, and is fronted by a shoal bank of triangular shape, which extends south-eastward nearly $1\frac{1}{2}$ miles, with depths of from $5\frac{1}{2}$ to 13 fathoms near the edge; the outer extreme of the bank lies $1\frac{3}{8}$ miles E. by N. $\frac{1}{2}$ N. from San Rafael point.

PASSAGES BETWEEN TIKAO and MASBATE.—

A chain of islets and rocks with channels between them extends from San Rafael, the south point of Tikao, to Vigia point in Masbate $8\frac{1}{2}$ miles south-eastward. The most practicable of these channels are between Matabao islet and Black rock; between Black rock and Magearagui islet; and between Adyagan and Vigia point; the first of these is about 6 cables wide, with a depth of 15 fathoms; the second is 9 cables wide, with a depth of 27 fathoms, and the last has a depth of from 6 to 14 fathoms.

Charts 3369, 3370.

Matabao lies off San Rafael point, between which and the islet there is a narrow passage with a depth of 7 fathoms.

From the east side of this island a bank of sand extends $1\frac{1}{4}$ miles to the north-east, with $2\frac{3}{4}$ fathoms over it, and $5\frac{1}{2}$ to 8 fathoms near the edges. A rock, with less than 6 feet water on it, is charted 2 cables eastward of Argos point, the southern point of the island: Argos point may be passed to the southward at a distance of a quarter of a mile.

General charts 3369, 2577, 943, 1263.

Charts 3369, 3370. Var. 1° E.

Light (*Lat. 12° 18' N., Long. 123° 48' E.*).—A *red fixed* lantern light, elevated 93 feet above high water, and visible 7 miles in clear weather, is exhibited from a concrete house, 20 feet high, erected on Argos point. For arc of obscuration, *see* Light list and chart.

Black rock (*Cabeza negrito*), awash at high water, rises from a shoal which lies north-west and south-east, extending nearly half a mile to the northward of Black rock, and over one cable southward of it. On the western side of Black rock is another rocky shoal, over a quarter of a mile in length and a cable wide, covered by $5\frac{1}{2}$ fathoms. On the eastern side of Black rock there is another shoal about a third of a mile in diameter, covered by $4\frac{3}{4}$ fathoms, from which rocky ledges upon which there is a depth of $5\frac{1}{2}$ to 8 fathoms extend a quarter of a mile northward and two-thirds of a mile eastward. The passages between these shoals are from one to two cables wide and 8 fathoms deep.

Beacon.—A concrete beacon, supporting a wooden post, carrying two white targets with black centres, is erected on the highest part of Black rock. It rises 17 feet above mean high water.

Magearagui island lies $1\frac{1}{2}$ miles south-south-eastward of Black rock. A shoal, with $4\frac{3}{4}$ fathoms at its extremity, extends half a mile northward from the north point, and north-eastward and eastward from the island are two detached shoals, covering a space of $1\frac{1}{2}$ miles in length north and south, the outer edges of which are more than a mile from the shore. On the northern shoal the least depth is $4\frac{1}{4}$ fathoms, and on the southern $1\frac{1}{2}$ fathoms at its southern end.

Adyagan (Deagan) island, lying over half a mile north-westward from Vigia point in Masbate, is 2 miles long, north-west and south-east, three-quarters of a mile wide, and has a lake in its northern part. It is surrounded by a narrow reef, and a bank extends off its eastern side to a distance of one mile from the shore, with depths of from $2\frac{3}{4}$ to $3\frac{3}{4}$ fathoms near the edge, outside which there are from $6\frac{1}{2}$ to 16 fathoms. This bank extends round the south end of the island and three-quarters of a mile up the western side, with a width of $1\frac{1}{2}$ cables. Between Adyagan and Magearagui are two islets.

Directions.—Vessels bound eastward passing between Matabao and Black rock should steer East, giving the south point of Matabao a berth of about 3 cables, until Magearagui islet bears South: vessels bound westward should steer West until Argos point bears North. Vessels passing between Black rock and Magearagui should steer a mid-channel course, heading about N.E. by E. $\frac{1}{4}$ E. for San Andres, until the middle of the cliff of Adyagan or Deagan island bears South, if

General charts 2577, 943, 1263.

Charts 3369, 3370. Var. 1° 0' E.

bound eastward; if bound westward continue in the opposite direction until Argos point, Matabao, bears North.

The channels between Magearagui and Adyagan and the intermediate islets are of no importance.

The passage between Adyagan and Vigia point, in Masbate, is 4 or 5 cables wide, and carries a depth of 6 to 14 fathoms, but the deep water channel is less than a quarter of a mile wide. Vessels using this channel, bound eastward, should give the south point of Adyagan a berth of a quarter of a mile, and steer out E.N.E. for 2 miles, when course may be shaped as required. Bound westward, bring the middle of the passage to bear W.S.W. when about 2 miles distant, and steer for it, passing the south point of Adyagan at a quarter of a mile.

Tidal streams.—Between Tikao and Masbate there is an exceedingly strong race, with whirlpools, which must be passed through at a considerable speed to maintain steerage. The tidal streams run very strong through the Black rock channels, reaching a velocity of 3 to 5 knots at springs, with violent eddies. The streams are said to run less strongly in the channel between Vigia point and Adyagan island.

Chart 3369, Luzon island to Masbate island, &c.

NORTH-EAST COAST OF MASBATE.—Bugui point, the northern extremity of Masbate, is moderately high, rugged, and steep-to, and can be passed close to in a depth of 7 or 8 fathoms; from the point the coast trends east-south-east for a distance of 9 miles, as far as Port Barrera, and is clean and bold. *See view a*, at page 536.

LIGHT (*Lat. 12° 36' N., Long. 123° 15' E.*).—Upon Bugui point is exhibited, at an elevation of 219 feet above high water, an *alternating group-flashing red and white light*, with a period of *ten seconds*, showing thus:—*red flash; eclipse, four and a quarter seconds; white flash; eclipse, one and a half seconds; white flash; eclipse, four and a quarter seconds*; visible 22 miles in clear weather. It is situated near the extreme point, and is shown from a white cylindrical tower, 48 feet in height, with dwelling attached. For arc of visibility, *see* Light list and chart.

Port Barrera is capacious, with good holding ground. The surrounding land is mountainous, of a red colour, and furnishes good wood for building; the shores are covered with mangroves to the waters edge.

Colorada point, the western entrance point, may be recognised by its red cliffs; a ledge of rocks projects 3 cables eastward from the point with 4½ fathoms on its edge.

General charts 2577, 943, 1263.

Chart 3369, Luzon island to Masbate island, &c. Var. 1° E.

Katbatan point, on the eastern side of the entrance, $1\frac{3}{4}$ miles south-eastward of Colorada point, has a reef extending $2\frac{1}{2}$ cables, with a conspicuous rock on its extremity.

Reefs extend three-quarters of a mile from the western, and half a mile from the southern sides of the port.

The depth of water in the middle of the port is from 17 to 30 fathoms, coarse sand, but it decreases westward and becomes rocky.

On the south side a creek or branch of the port into which a river enters, penetrates 2 miles inland, and offers good protected anchorage for small vessels, care being taken to avoid a small reef lying about 3 cables off Amoron point, on the eastern side of the channel. The northern part of the creek has depths of from $3\frac{1}{4}$ to $4\frac{3}{4}$ fathoms over a length of $1\frac{1}{4}$ miles with a width of a quarter of a mile.

Buoy.—A black can buoy is moored about 3 cables northward from the village of Aroroy, on a reef.

Shoals.—A small shoal of mud, with a depth of $1\frac{1}{2}$ fathoms on it, lies in the entrance to the southern arm of Port Barrera, with Colorada point bearing N.N.E. $\frac{1}{2}$ E., distant $1\frac{3}{4}$ miles. Immediately westward of the position of the $1\frac{1}{2}$ -fathoms shoal is a reef with a least depth of 4 feet over it.

Light (*Lat. $12^{\circ} 32'$ N., Long. $123^{\circ} 23'$ E.*).—A red fixed light, elevated 103 feet above high water, and visible 7 miles in clear weather, is exhibited from a concrete house, 16 feet high, on Colorada point, western side of entrance to Port Barrera.

Anchorage.—There is good anchorage in a depth of 22 fathoms, coarse sand and mud, off the inner side of the sand beach of Colorada point, which is steep-to, also in the entrance of the port, with Colorada point bearing North, in 24 fathoms. Small vessels can anchor in the creek previously mentioned.

Village.—The village of Aroroy, with about 1,000 inhabitants, is situated about three-quarters of a mile south-westward of Katbatan point. It is a port of call for small steamers, which anchor in 14 or 15 fathoms about a quarter of a mile north-westward of the village; this anchorage is exposed to northerly and north-easterly winds.

Water.—Good water can be procured from a cascade near the mouth of the Lumukluk river in the western part of the port, or from up the river previously mentioned. There is no convenient watering place on the shores of the port.

Tide.—The range of tide at Port Barrera is about 5 feet.

Port Magdalena, 9 miles south-east of Port Barrera, is very small, and open to the northward, but is considered an excellent anchorage, safe at all seasons; vessels can secure with hawsers to the trees of the inner part of the port. The anchorage is surrounded by

General charts 2577, 943, 1263.

Chart 3369, Luzon island to Masbate island, &c. Var. 1° E.

high land covered with impenetrable woods. There are reefs around both the exterior points of the port. The depth of water is 20 fathoms at the entrance, lessening to $3\frac{1}{4}$ fathoms before the village at the bottom of the port, where there are some shoals near the beach.

Supplies.—Vegetables, poultry, and honey are all that can be had here; water can be procured from two rivulets, but it must be taken from a long way up, as it is not fresh near the port. The village of Balino is $2\frac{1}{2}$ miles west of the port, on the shore.

Plan of Port Palanog on 962.

PORT PALANOG (Masbate harbour), 6 miles south-east of Port Magdalena, is a small harbour with available anchorage space about $1\frac{1}{4}$ miles long and half a mile wide, in a depth of 6 to 25 fathoms, well sheltered from all winds. The channel is only $1\frac{1}{2}$ cables wide between the point on which the lighthouse stands and the reef extending nearly 4 cables towards that shore from the south-east entrance point; the depth in the passage is 27 to 32 fathoms. The interior of the port is lined by reefs, that on the northern side projecting out 4 cables from the shore, when it falls abruptly into a depth of 10 fathoms; the extreme eastern end of this reef bears S. 39° W., distant $4\frac{1}{4}$ cables from the lighthouse. The south-west part of the harbour is occupied with a mud flat to the distance of nearly a mile from the head of the harbour. Pulumbato point, on the south side of the port, is a well-defined rocky point covered with thick bushes, with cocoanut trees on each side. The wreck of the steamer *Bulusan* lies 50 yards from the end of the old pier, covered by 9 fathoms water.

Light (*Lat. $12^\circ 23'$ N., Long. $123^\circ 36'$ E.*).—A red fixed light, elevated 52 feet above high water, and visible 9 miles in clear weather, is shown from a white framework tower, 42 feet high, on the western side of the entrance. Signal and telegraph station.

Buoys.—A red conical buoy is moored in 30 feet water off the end of the reef extending from North-west point, west side of the entrance to the port, with the light structure bearing S. 24° W., distant $4\frac{1}{2}$ cables.

A black can buoy lies in 3 fathoms on the east side of the entrance on the western edge of the coral reef, about 2 cables S. 43° E. from the lighthouse. Vessels are cautioned not to approach the buoy too closely or to place too much reliance in its position, as it is liable to slip off the reef.

Directions.—To enter Port Palanog, steer in with the lighthouse bearing S.W. until the shore north-west of North-west point is about to be shut out, when head for Pulumbato point, keeping it bearing S. by W. $\frac{1}{4}$ W., and keeping a good look-out for reefs; anchor off the

General charts 3369, 2577, 943, 1263.

Plan of Port Palanog on 962. Var. 1° E.

wharves of Masbate, distant about $1\frac{1}{2}$ cables, in a depth of 16 or 17 fathoms, mud.

Masbate (Palanog).—The town of Masbate, a coastwise port, is situated on a bluff on the eastern side of the harbour. View *b*, at page 488.

Tides.—It is high water, full and change, at Port Palanog, at 11h. Om.; springs rise 6 feet.

Telegraph.—Masbate (*Lat. 12° 22' N., Long. 123° 37' E.*) is a telegraph station. Cables from Romblon, Kalbayok, and Sorsogon are landed here.

Chart 3369, Luzon island to Masbate island.

Mobo bay, south-east of Port Palanog, is included between Bai-bai and Sagsausan points, and is about 2 miles wide and one mile deep. It is almost closed by Buntud bank, which leaves but a narrow entrance channel from northward, 11 fathoms deep. Taku shoal, $1\frac{1}{4}$ cables north of Sagsausan point, is $2\frac{1}{4}$ cables in extent, and covered by 3 feet water; Mobo shoal, 4 cables westward of the above point, is $2\frac{1}{4}$ cables in length, with 3 feet water over it. Between these shoals and the coast of Masbate there is a passage $1\frac{1}{4}$ cables wide, with a mean depth of 5 fathoms in mid-channel.

Between Taku and Mobo shoals, and Buntud bank, and between Mobo shoal and the coast westward, there are channels of 12 to 18 fathoms depth; the anchorage of Mobo, with depths of from 14 to 18 fathoms, is within the space encircled by these shoals.

A small river runs into the southern part of the bay, on the bank of which, at less than a mile from the mouth, stands the town of Mobo. The land round about it is hilly, and very fertile.

Uson bay is situated about 9 miles south-east of Mobo bay, and is $2\frac{1}{2}$ miles wide in the entrance between Paniki and Tabunan points, and about 3 miles in depth. The lower half of the bay is filled with a sandbank. The depth in the entrance is 22 fathoms, gradually decreasing to the bank at the head of the bay; they are 11 fathoms off the town of Uson, which lies on the eastern side of the bay. A bank of sand, with $5\frac{1}{2}$ fathoms at its edge, advances half a mile north-westward from the western side of Tabunan point.

Tabunan point is a broad, hilly headland advancing 3 miles north-westward from the general coastline. It is surrounded by a narrow reef, and shoal water extends about a quarter of a mile from the shore.

Naro bay is between Tabunan point and Vigia point, 4 miles eastward. It is clear and deep, having 27 fathoms at the entrance, anchorage depths of from 13 to 20 fathoms, and $5\frac{1}{2}$ fathoms at the

General charts 3369, 3370, 2577, 943, 1263.

Chart 3369, Luzon island to Masbate island, &c. Var. 1° E.

mouth of a small stream within the bay, near the mouth of which is the town of Naro.

Vigia point, the eastern point of Naro bay, has on its western side Kudao islet, clean on the western side, with a depth of 18 fathoms close to it. On the eastern side of the point there is a shoal which extends nearly one mile out in a north-east direction, and fringes the coast to the southward for a distance of 3 miles, where it narrows in to the coast.

Chart 3371, Libukan islands to Naro bay.

The EAST COAST OF MASBATE, from Vigia point to Kaduruan point, the south-east extremity of the island, is fairly clean, with depths of 5 to 8 fathoms at a short distance from it, except in the vicinity of Vigia point. Shoal ground extends to about 3 cables from Matayon point.

Plan of Port Kataingan on 962.

PORT KATAINGAN (*Lat. 12° 0' N., Long. 124° 0' E.*), 19½ miles S.E. by S. of Vigia point, is a clean and capacious port, open to the south-east, with a depth of 4 to 17 fathoms, and good holding ground; it is about one mile wide, and extends 4½ miles north-north-westward in the direction of Tetas de Kataingan, two prominent rounded hills at the head of the port. The shores of the port are fringed with reefs and shoals to the distance of one to 4 cables, but on the eastern side three-quarters of a mile within the entrance point, a broad rocky ledge, covered by one fathom only, extends westward from the coast to the distance of 4½ cables. The upper part of the bay is shallow to the distance of two-thirds of a mile from its head.

Dumurug point, the eastern entrance point, is bordered by a shoal extending about 1½ cables southward. On the eastern side of the peninsula, of which Dumurug point is the southern extremity, the 5-fathoms contour lies about half a mile from the shore.

Badlay (Basley) island lies about three-quarters of a mile south-south-eastward of Dumurug point, on the east side of the entrance, and is surrounded by a shoal, 4 cables wide, which extends as a ledge of sand and rocks from Badlay island towards Bugtun island for a distance of 1½ miles, with a breadth of 2¾ cables; the depth on the southern end of the ledge is 1½ fathoms, but at 4 cables southward of Badlay island is a rocky ledge 1½ cables in extent, on which the depth is less than 6 feet. There is a depth of 6 to 13 fathoms in the channel, half a mile wide, between Badlay island and the point.

Ordones bank, covered by 5½ fathoms, is a rock 20 feet in diameter, and steep-to, lying one mile S.W. ¾ W. of Dumurug point, and 4 cables from the western shore. The passage between this bank

General charts 3371, 2577, 943, 1263.

Plan of Port Kataingan on 962. Var. 1° E.

on the one side, and Badlay island and Dumurug point on the other, is one mile wide, and has a depth of 17 to 20 fathoms.

Anchorage.—The bottom of the port is rocky on the eastern side, and sandy on the western. The usual anchorage is half a mile south-east of the town of Kataingan at the northern end of the port in a depth of $4\frac{1}{2}$ fathoms.

Port Kataingan is the best typhoon anchorage in the vicinity, anchorage being off the bight on the western side of the bay, about 3 cables northward of Mintag point.

Chart 3371, Libukan islands to Naro bay.

Bugtun island (Lat. $11^{\circ} 53' N.$, Long. $124^{\circ} 5' E.$), one mile in diameter, and 313 feet in height, is situated $4\frac{1}{2}$ miles southward of the entrance to Port Kataingan, and about one mile from the nearest coast of Masbate. It is encircled by a narrow reef, and shoal water extends a quarter of a mile north and south from it.

Balanguingue islet lies 2 miles southward of Bugtun, and $1\frac{3}{4}$ miles from the coast of Masbate. It is fringed by a reef which extends about two cables north-westward of it. Near the centre of the channel between these two islands there is a depth of 8 fathoms, position doubtful.

The channels between Balanguingue and Bugtun islands and the coast of Masbate appear deep and clear.

ISLANDS BETWEEN MASBATE and SAMAR.—

The group of five islands, lying about midway between the southern part of Masbate and the coast of Samar, consists of Tagapula to the north, Maripipi to the south, with Talahit between them; and, eastward of the last named, the islands Kamandak and Limbankauayan. There are also several small islets near and amongst these larger islands; they are all high, clean, and steep-to.

Tidal streams.—The flood sets to the south, and the ebb to the north; the tidal streams in the channels are strong.

Tagapula island, about $8\frac{1}{2}$ miles north-east of Dumurug point, at the entrance to Kataingan, is 6 miles long east and west, $2\frac{1}{2}$ miles wide at its western part, and rises to a height of 1,942 feet near its centre. It is fairly clean, and steep-to.

España shoal, of coral and rock, half a mile long north and south, with a breadth of $1\frac{1}{2}$ cables, and having a depth of $1\frac{1}{2}$ fathoms over it, lies nearly one mile eastward of the north-east point of Tagapula.

Sibugay islet, half a mile northward of Tagapula island, is clean and steep-to, and rises to a height of 436 feet. The channel between is clear, with a depth of 22 fathoms in the middle.

General charts 3371, 2577, 943, 1263.

Chart 3371, Libukan islands to Naro bay. Var. 1° E.

Talahit island (Mesa island) lies $7\frac{1}{2}$ miles south-east of Tagapula. It is 5 miles long north-east and south-west, and about $1\frac{1}{2}$ miles wide; the northern part is 1,073 feet high, and the southern part rises steeply to a table summit of 1,791 feet high. The town of Alimagro is situated at the head of Buang bay, a large indentation at the south-west end of the island. The islet Bagasipal is nearly connected with the south-west point.

Tomasa islet, 732 feet high, lies $1\frac{1}{4}$ miles east of Talahit, with a short reef projecting westward from it; between the two are the smaller islets Arturito and Maria, with clear passages between them.

Kamandak island (Lat. $11^{\circ} 58' N.$, Long. $124^{\circ} 25' E.$), 2 miles north-eastward of Tomasa, is nearly circular, about 2 miles in diameter, and rises to a height of 1,401 feet; its shores are clean and steep-to.

Limbankauayan island, lying 5 miles eastward of Talahit, has clean coasts, is steep-to, and rises to a height of 1,519 feet.

Santo Nino bay, situated on the north side of the island, is a small sheltered harbour, the entrance being about 100 feet wide and 9 feet deep, inside which is a space 350 yards in diameter and about 5 fathoms deep in the middle. In entering, the eastern entrance point should be passed close, to avoid the rocks and shoals westward. The town of Santo Nino lies on the western shore of the harbour.

Pilar islet, on the north-west side of Limbankauayan, is small, steep, except on the east side, where a short reef projects, and 168 feet high.

Maripipi island, lying 5 miles southward of Talahit, is a rounded mountain 2,992 feet high, covered with trees; the sides are clean and very steep-to; it is about $3\frac{1}{4}$ miles in diameter.

The sambabuas islets, lying about 2 miles off the south-west coast, are four rocky islets close together, surrounded by a shoal of sand.

Rock.—A rock, awash, lies about three-quarters of a mile N. 18° E. from the northern Sambabuas islet, and more than a mile westward from Maripipi; from the rock the highest part of Maripipi bears N. 84° E.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $1^{\circ} 10' E.$

WEST COAST OF LEITE.—The northern part of the west coast of Leite is described here; the southern part will be found in Chapter VII., together with general remarks on the island and the western coast.

Rabin point, the north-western extremity of Leite, is fringed by a narrow reef, which extends a quarter of a mile northward and half a mile both eastward and westward.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° 10' E.

Gigantangan island (*Lat. 11° 35' N., Long. 124° 16' E.*), off the north-west point of Leite, is $1\frac{1}{2}$ miles long north and south, and one mile wide; it is surrounded on all sides except the north-west by a narrow reef. At three-quarters of a mile north-eastward from the north-east point the depth is $5\frac{1}{2}$ fathoms, elsewhere round the island the water is deep. The channel that separates it from Leite is $1\frac{1}{2}$ miles in width, with depths from 9 to 25 fathoms.

Coast.—From Rabin point the coast trends south-westward for 2 miles to Dungun point, and then south-south-eastward for $7\frac{1}{2}$ miles to Matung point, the north entrance point of San Isidro bay. There are three small bays, shallow, and fringed with reefs, on this stretch of coast.

San Isidro bay, south of Matung point, is three-quarters of a mile wide and extends $1\frac{1}{2}$ miles eastward, with depths of from 2 to 10 fathoms. The outer part of the bay is deep, but the eastern part is filled with shoals. The town of San Isidro at the head of the bay has a long stone mole extending from it.

Arévalo bay, about 2 miles southward of San Isidro bay, is shoal; the village of the same name lies at the head of it.

Malcampo and Tabango are two bays lying 2 and 4 miles respectively, south of Arévalo bay; they are both nearly closed by reefs, and each has a village at its head. The depth in Tabango bay is from 2 to 5 fathoms.

Kampopo bay, about half a mile southward of Tabango bay, is larger, has depths of from 2 to 7 fathoms, and would appear to offer shelter in the north-east monsoon. The upper part of the bay, like others in this vicinity, is shoal.

Dauahon islet, between Kampopo bay and Jinagnatan bay, the next opening southward, is very small, and appears to be steep-to.

Silad bay, about $2\frac{1}{2}$ miles southward of Kampopo bay, is about three-quarters of a mile in extent, and has depths of from 2 to 7 fathoms. Blanca point is the south entrance point. On the shores of the bay are the villages of Hinabuyan and Silad.

Chart 2578, Eastern part of Sulu or Mindoro sea.

Coast.—From Silad bay to Kanaguayan point, the northern entrance point of Port Palompon, a distance of about 11 miles, the charts shows a bold coast, that can be approached to half a mile at any point except near Kanaguayan point.

Plan of Port Palompon on 957.

Kanaguayan point, about 30 miles southwards of the north-western point of Leite, is the most salient point in this vicinity. It is a broad, low, flat point, covered with cocoanut trees, and fringed with

General charts 2578, 943, 1263.

Plan of Port Palompon on 957. Var. 1° 10' E.

mangroves. It is surrounded by reefs to the distance of about 4 cables, and shoal water extends about $1\frac{1}{4}$ miles north-westward from the point.

Tabok, and Gumalak island southward of it, are low, wooded islands lying on the same reef, which extends in some places more than half a mile westward of them. Kabgan, a similar but smaller islet lying southward of Gumalak, is also surrounded by reefs which extend over half a mile seaward.

Port Palompon (*Lat. 11° 3' N., Long. 124° 23' E.*) is formed by a narrow channel between the coast south of Kanaguayan point and the reef on which Tabok island is situated; the only entrance is to the northward, between the point and the island, the southern end of the channel being closed by low reefs covered with mangroves.

There is a limited area of good anchorage in from 7 to 10 fathoms in front of the town, protected from westerly winds and seas by Tabok island and its surrounding reefs.

The entrance, between the reefs surrounding Kanaguayan point and the reef of Tabok island, which extends west-north-west three-quarters of a mile from its north point, is about $2\frac{1}{4}$ cables wide, with a depth of 25 fathoms. Proceeding inwards, the passage becomes narrower and shoals gradually, so that in front of the church, where there is the best anchorage, it is about $1\frac{1}{4}$ cables wide, with a depth of 10 fathoms. Anchorage can also be had close to the sandy point at the south end of the town, where vessels of any size can lie alongside, secured to the shore. From this point the channel continues to contract and the depth to decrease until off Gumalak island, where it is only 2 fathoms. The reefs show well at low water, and are generally marked by fish traps and bamboo poles with bushy tops, but these must not be relied on.

Directions.—To make the Port of Palompon, Kalangaman islet should be brought to bear N. 63° W., when a course S. 63° E. will lead to the entrance about a quarter of a mile southward of Kanaguayan point. When the point is abeam haul eastward to pass about a quarter of a mile northward of Tabok island, keeping a good look-out for the reefs on either side. When the church bears S. 41° E. haul southward, and keep in mid-channel until the anchorage is reached.

Palompon.—The town of Palompon is situated on the shore abreast of Tabok island, about a mile south-east of Kanaguayan point. Supplies of beef and vegetables may be obtained, also fresh water.

Chart 2578, Eastern part of Sulu or Mindoro sea.

Coast.—The reef that surrounds Tabok and Gumalak islands continues to the southward to Dulhugan point, extending to a distance of

General charts 2578, 943, 1263.

Chart 2578, Eastern part of Sulu or Mindoro sea. Var. 1° 10' E.

2 miles from the shore. When passing this reef, Kanaguayan point should not be brought to bear northward of N. 13° E.

Dulhugan point, the south-western extremity of the land in this vicinity, is low and flat. The reef that borders the coast from Tabok island terminates here, and the south side of the point is clean and steep-to.

Port Dupon, lying 2 miles eastward of Dulhugan point, is $1\frac{1}{2}$ miles wide at the entrance, extends $2\frac{1}{2}$ miles northward, and has a depth of 19 fathoms in the centre, decreasing towards the head of the bay, which is foul. The village of Kiot lies on the eastern shore.

Good anchorage may be found in 8 fathoms, half a mile from the western shore of the port.

Matlang bay, about one mile eastward of Port Dupon, is small and well-sheltered from all except southerly winds. The anchorage space is restricted by reefs from both sides and at the head. The village of Matlang lies on the eastern entrance point. Water can be obtained in both the above bays.

Katunangan point (*Lat. 10° 52' N., Long. 124° 31' E.*), 4 miles eastward of Matlang bay, is low, flat, fringed with mangroves, and surrounded by a very narrow steep-to reef.

Chart 2577, Between San Bernardino and Mindoro straits.

NORTH COAST of LEITE.—From Rabin point, the north-western extremity of Leite, the coast trends south-eastward, forming the south-western side of Biliran strait for about 10 miles ; it continues 5 miles farther in the same direction, and then turns northward for $4\frac{1}{2}$ miles, forming Leite bay, 2 miles wide at the entrance, and shoal.

The town of Leite stands at the head of the bay, at the mouth of the Palapay river. A stone mole extends about 2 cables westward from the town, with sufficient water at the end at high tide for small craft.

From the north-eastern entrance point of Leite bay the coast trends eastward for about $4\frac{1}{2}$ miles, forming the southern side of Biliran strait. On this part of the coast, at less than a mile from the shore, are two peaks, 1,637 and 2,074 feet high, respectively, the eastern being the higher of the two.

Kalumpihan islet lies $2\frac{1}{2}$ miles eastward of the eastern peak just mentioned, and one mile from the shore, with a deep channel between.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

BILIRAN ISLAND, on the northern coast of Leite, is about 19 miles long north-west and south-east, and 11 miles wide; it is high and mountainous throughout, and attains an elevation of 4,472 feet. The coast of Biliran island is clean, and can be safely approached anywhere to half a mile except in the Biliran strait, between it and Leite. There are several islets and banks off the north-western part of the island.

Chart 2987, San Pedro bay to Libukan islands.

Water.—An abundant supply of good water may be obtained from a spring on the east coast of Biliran, about a quarter of a mile southward of Gamai point. The locality may be identified by a white beacon, said to be visible from a distance of 3 or 4 miles. The water is brought from the spring by a 2½-inch pipe, terminating near the beacon. To obtain water vessels should steer W.N.W. for the beacon, anchor in 20 fathoms, and haul the stern into a depth of about 3 fathoms by means of lines to the shore. From this position about 300 feet of hose will be required to reach the pipe.

Chart 3371, Libukan islands to Naro bay.

Islets and dangers.—**Tagampul** (*Lat. 11° 43' N., Long. 124° 20' E.*), lying about 2 miles north of the north-west point of Biliran, is very small, and apparently clean. A rocky patch lies a quarter of a mile east-north-east of the east end of the islet.

Remus rock, about half a mile north-north-east of Tagampul, is of small extent, and covered by 1½ fathoms least water; it has deep water around it.

Tomasa islet is about 6 cables south-east of Tagampul islet; it is very small, and has a shoal off the north-east side.

Genuruan islet is about half a mile off the north-west coast of Biliran.

Tinkansan islet lies about 1½ cables west of the north-western point of Biliran, from which it is separated by a channel having a depth of 14 fathoms in the middle.

Chart 2577, Between San Bernardino and Mindoro straits.

Kalutan islet is 2½ miles southward of the north-west point of Biliran, and one mile from the shore. It has rocks on its south-west side, and shoal water on the south-east.

Kaygan islet is a little more than a mile south-eastward of Kalutan islet, and three-quarters of a mile from the shore. It has shoal ground off the north-east part.

Pilar rocks are half a mile west of Kaygan islet.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 1° E.

Biliran strait, separating the island from the north-west promontory of Leite, is 13 miles long, and has a general width of about $2\frac{1}{2}$ miles; at the southern entrance the channel is contracted by Poro and Kalajit islets off the south coast of Biliran, and a bad reef, which extends from the Leite shore one-third across the strait.

The fairway lies between Leite and Poro islet, and deep water can be carried by a vessel keeping within 60 feet of the south end of the islet. The passage here is but 150 feet in width, and this is reduced to a practical width of 100 feet, by the reef projecting across it from the Leite shore. The western approach to the narrows is shoal, the depth being 2 fathoms.

Biliran.—The town of Biliran is situated on the south coast of the island, about half a mile westward of the narrow part of the strait. Anchorage may be had in front of the town in $2\frac{1}{2}$ fathoms.

Chart 2987, San Pedro bay to Libukan islands.

North coast of Leite.—Karigara bay.—Between the eastern entrance to Biliran strait and Baluarte point, the southern entrance point of Janabatas channel, about 16 miles eastward, the shore recedes southward about 8 miles, forming Karigara bay. The shore in the eastern part of the bay is fronted by shoal water, extending in some places to a distance of three-quarters of a mile. The western shore of the bay is clean and steep-to. The entire bay is clear and deep, and the chart shows no danger more than three-quarters of a mile from the shore, with the exception of a small shoal of $2\frac{3}{4}$ fathoms lying about one mile N. 36° W. from Jalaba point, in the south-east part of the bay. In the centre and eastern parts of the bay the depth of 20 fathoms is found at from about $4\frac{1}{2}$ to 4 miles from the shore.

Karigara, a place of some trade, lies at the head of the bay. There is a large municipal building surrounded by about twenty European-built residences, and a number of godowns and stores, the whole environed by nipa houses; there is a prominent building at the west end. Steamers touch there about once a fortnight.

It runs out shoal to the 5-fathoms contour line, distant half a mile from the coast. There is anchorage in a depth of 7 to 12 fathoms at the distance of about 8 cables off-shore.

General charts 2577, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

LIGHT (Lat. $11^{\circ} 18' N.$, Long. $124^{\circ} 41' E.$).—A red fixed light, at an elevation of 29 feet above high water, and visible 9 miles in clear weather, is exhibited from a concrete pillar, 25 feet high, erected on the spit at the river entrance at Karigara.

Telegraph.—Karigara is a telegraph station. The cable from Katbalogan, Samar, is landed here.

Barugo.—Off Barugo, a small town about 3 miles north-east of Karigara, the depth decreases rapidly. Anchorage can be found in a depth of 8 fathoms, about one mile from the shore, with a large white storehouse bearing S. by E. Shoal water extends out about three-quarters of a mile from the western side of the town, and a short distance westward, off the mouth of the Minusuong river ; the shoal is extending.

Chart 3370, San Bernardino strait and approaches.

SAN BERNARDINO STRAIT.—San Bernardino strait, which separates the south-east extreme of Luzon from the north-west part of Samar, is so named from the small islets which lie in its eastern entrance. It is of much importance, as it is used by most of the coasting vessels bound for the eastern coasts of Luzon and Samar islands, as well as by some of the vessels crossing the Pacific and those trading between Manila and Australia. The strait is deep and free from dangers except a few near the shores. The channels eastward and westward of the San Bernardino islets are 5 and $7\frac{1}{2}$ miles wide respectively, with depths of 30 to 70 fathoms. Dangerous seas and tide rips are encountered in the strait during the north-east monsoon, but they are not reported in the south-west monsoon.

The strait was formerly the great highway for the Spanish galleons on their way from Manila to Acapulco, in North America.

South point of Luzon.—From Tagiran point (page 487) the coast trends south-eastward for $1\frac{1}{2}$ miles to Sujak point, and then eastward for $5\frac{1}{2}$ miles to Kolasi point, forming a succession of sandy bays with small streams flowing into them, and is clean to within a short distance of the shore, except for Hamorauan and Kalantas banks.

Plan of Matnog bay and Tiklin strait on 3475.

Hamorauan bank (Lat. $12^{\circ} 32' N.$, Long. $124^{\circ} 4' E.$), about half a mile in diameter within the 10-fathoms limit, lies with its centre about half a mile off-shore. It has 2 fathoms on it, but the Cabezos shoal, on the eastern side of the bank, has a depth of one fathom, from which Kolasi point bears N. $63^{\circ} E.$, distant three-quarters of a mile. It is a danger in the track of vessels approaching the south entrance of Tiklin strait. The channel between the bank and the shore reef is less than a cable wide, with 13 fathoms in the middle, and 7 fathoms

General charts 2577, 943, 1263.

Plan of Matnog bay and Tiklin strait on 3475. Var. 1° E.

between it and Kolasi point; between the bank and Kalantas bank, a quarter of a mile to the southward, the depth is 13 fathoms.

Babatgun anchorage is a small semi-circular bay included between Babatgun point to the west and Kolasi point to the east. It is nearly all shoal; a tongue of deeper water, with 8 fathoms at its head, penetrates between the banks on either side as far as abreast the western entrance point, from which it is distant about one cable.

Kalantas bank (Bombong), situated S. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles from Kolasi point, is formed of large black rocks and coral. The northern head is a flat rock, about 70 yards in length, and 5 feet above water; the depth increases rapidly to the northward. The shoal extends south and south-east from the flat rock, and at the distance of half a mile the depth is $3\frac{3}{4}$ fathoms, and at three-quarters of a mile the depth is 8 fathoms, rapidly increasing to the southward. The bank is also charted as extending 6 cables westward from the rock, with depths of $2\frac{3}{4}$ to $6\frac{1}{2}$ fathoms, and about 9 cables north-westward with depths of $4\frac{1}{2}$ to 9 fathoms. The tidal streams cause heavy breakers on the bank, giving it the appearance of a white sandy islet.

A wreck lies on the south-eastern part of the bank.

Clearing marks.—Kapul island light, bearing N. 89° E., leads nearly one mile southward, and the south-eastern extreme of Juak island, bearing N. 28° E., leads eastward of Kalantas bank.

Tidal streams.—The tidal streams run with great strength near and over Kalantas bank, forming strong eddies; they are reported to attain, at times, a rate of 8 knots.

Tiklin strait is the channel between the coast of Luzon and the islands Kalintan, Huak, and Tiklin. Although this channel is sufficiently deep, it is not safe for large vessels on account of the tidal streams and eddies in it; it is much used by coasting steamers. The western shore of the strait, between Kolasi and Padang points, is composed of broken coral covered by mangroves, and fronted by reefs from a half to $3\frac{1}{2}$ cables wide, with a depth of $3\frac{3}{4}$ to 10 fathoms close outside them. The least navigable width of the strait is about $1\frac{1}{2}$ cables, between Burungburungan and Kalintan islands.

Shelter may be found if required in Kolasi bay, which lies between Kolasi point and the island to the northward of it.

Matnog bay (Lat. $12^\circ 35' N.$, Long. $124^\circ 5' E.$), is small and open to the eastward; it is fringed on the north and south sides by a narrow reef with a depth of 3 to 5 fathoms near the edge, and has a depth of 8 fathoms in the middle. On entering, care must be taken to avoid a rocky shoal covered by $1\frac{1}{2}$ feet at low water, with a rock

General charts 3370, 2577, 943, 1263.

Plan of Matnog bay and Tiklin strait on 3475. Var. 1° E.

awash at its outer end, which extends one-third of a mile N.N.E. from the southern point of the bay. In front of the bay is a bank about 5 cables in length and 4 in breadth within the 10-fathoms line, on which the least depth is $5\frac{3}{4}$ fathoms, hard bottom; this spot is about one mile from the head of the bay. During easterly winds the bay is not safe, as a heavy surf breaks within it.

To enter, bring the hill on Tiklin island to bear East, and steer West into the bay. The entrance between the reefs is one-third of a mile wide. Small vessels anchor in 3 fathoms of water, with the town bearing about W. $\frac{3}{4}$ N. There are no appreciable currents in the bay.

The town of Matnog (*Lat. 12° 35' N., Long. 124° 5' E.*) on the west side of the bay, is poor, and offers few resources; the white roof of the church is conspicuous.

Tides.—It is high water, full and change, at Matnog bay, at 7h. 47m.; rise of tide about $1\frac{1}{2}$ feet.

Kalintan island, the southernmost of a group of three islands situated eastward of the southern end of Luzon, lies two-thirds of a mile eastward of Kolasi point, is 2 miles in length north-east and south-west, and 358 feet in height at the southern end. It is fringed by a narrow reef, and is nearly severed by Burahuan bay, which lies on the north-west side about one-third way from the north-east end. There is a small detached rock about one cable distant from the south-east shore of Kalintan.

Huak island, north-east of Kalintan, is only separated from it by a very narrow channel, with a depth of 14 fathoms, and is fringed with reef; both islands are rugged, and covered by ebony trees.

Tiklin island, 184 feet high, lies $1\frac{1}{10}$ miles north-east of Huak island, and one mile south-east of Padang point; a shoal projects from the south point nearly to Huak island, having near its extremity a rock awash at low water, distant three-quarters of a mile from Tiklin; northward of this rock, at from $1\frac{1}{2}$ to 3 cables distance, there are depths of $1\frac{3}{4}$ to $2\frac{3}{4}$ fathoms.

Magtimua rock, 3 feet high, lies about 6 cables south-eastward of Tiklin island on the eastern part of a bank some 3 cables in length on which the depths are $3\frac{1}{4}$ to 5 fathoms.

The passage between Huak and Tiklin islands is not safe.

Chart 3370, San Bernardino strait and approaches.

Naranjos islands are a group of six, lying close together, from $7\frac{1}{2}$ to 12 miles to the southward of the south point of Luzon; they are named respectively San Andres (or Maragat), Rasa (Majaba), Medio (Pagonarong), Darsena (Sila), Aguada (Ternate), and Escar-

General charts 3370, 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 1° E.

pada (Samputan); a seventh island, named Destacado (Bungul bungul) lies $3\frac{1}{2}$ miles south-east of Aguada. These islands are mostly from 400 to 750 feet in height, and rocky; their shores are rugged with occasional sand beaches. The channels between them are clear and practicable for vessels of all sizes with the exception of that between San Andres and Rasa, which is narrow, and that between Darsena and Aguada, which is shoal; but it is not safe for sailing vessels to use them, on account of the variability and strength of the currents, and the shifts of wind experienced among them. The depths between the islands are from 10 to 30 fathoms generally, so that a vessel could anchor in case of need, but the bottom is rocky; the best anchorage is north-east of Rasa island.

There is said to be good anchorage for vessels of any size in Lodo (Lode) bay, on the western coast of Destacado island, in a depth of from 6 to 10 fathoms. There is a reef near the middle of the bight extending about $2\frac{1}{2}$ cables to the westward, but by keeping near the northern point on entering and anchoring in 10 fathoms large vessels may swing safely.

Kapul island, lying $3\frac{1}{2}$ miles S.E. by S. of Kalintan island, is about $6\frac{1}{2}$ miles long north-north-west and south-south-east, and 2 miles wide; it is moderately high, the highest land, 791 feet, being on the south-eastern side about one mile south of the town Abak. The coast is generally rugged and steep, and it is not prudent to anchor near the shore.

LIGHT (*Lat. 12° 29' N., Long. 124° 8' E.*).—A *white group-flashing* light, showing groups of *three flashes every thirty seconds*, the eclipses between flashes being *four and a half seconds*, and between groups *twenty-one seconds*, is exhibited, at an elevation of 143 feet above high water, from a conical masonry tower, 48 feet high, with dwelling attached, situated on Totoog (Diablo) point, the north-western extreme of Kapul island; the light is visible 18 miles in clear weather. For arc of visibility, *see* Light list and chart. *See view b*, at page 536.

Anchorage.—At about the southern extremity of the island there is a little bay called Huban bay, with depths of 7 to 17 fathoms, which is probably the only place offering safe anchorage. Off the west point of entrance there is a remarkable pyramidal rock named Dakit dakit, which is useful as a guide. The chart shows a depth of $2\frac{3}{4}$ fathoms in the bay.

Diamante shoal, lying $2\frac{1}{4}$ miles S.E. by S. of the south point of Kapul, is 2 cables in extent, and composed of large boulders of rock with pinnacles covered by $1\frac{1}{2}$ fathoms of water; it is very steep-sided, dropping suddenly into depths exceeding 20 fathoms.

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 1° E.

Rubi shoal, about $1\frac{1}{2}$ cables in extent east and west, with a depth of about 6 fathoms on it (possibly less), and deep water close around, lies W. by N. $\frac{1}{4}$ N., distant $1\frac{1}{2}$ miles from Diamante shoal and $1\frac{3}{4}$ miles southward of Juban bay, Kapul.

Dalupiri island (Puercos), situated about 3 miles eastward of Kapul island, is 6 miles long north and south, and nearly 2 miles wide. It is 502 feet high, wooded, and bordered by sand beaches, with rocks close to them. A shoal of sand and coral, with depths of $3\frac{3}{4}$ to $6\frac{1}{2}$ fathoms on it, extends for a distance of nearly $2\frac{1}{2}$ miles northward of the north point of Dalupiri. A similar shoal extends southward from the south point of the island, the 5-fathoms limit being distant $1\frac{1}{2}$ miles, and the 10-fathoms line lying at the distance of 2 miles. Game is abundant, especially wild hogs. The channel between Dalupiri and the coast of Samar is $1\frac{3}{4}$ miles wide, and clear of danger, as is also that between Dalupiri and Kapul, except Diamante shoal in the southern approach.

Charts 3368, 3370.

San Bernardino islets, from which the strait takes its name, lie $13\frac{1}{2}$ miles north-eastward of Tiklin island. The southern and larger islet, on which the light is situated, is about 4 cables long north and south, and $1\frac{1}{2}$ cables broad; it is thinly wooded, and rises in the centre to a height of about 170 feet. There are two large rocks, about 10 feet high, 2 cables eastward of the southern islet, with foul ground between.

The northern islet, about $1\frac{1}{2}$ cables long and 100 feet high, is very rugged, and bare of vegetation; it is less than a cable from the southern islet.

These islets are situated on the south-western end of a bank having depths of from 10 to 20 fathoms, and extending 6 miles north-eastward, surrounded by much deeper water. There are tide rips on this bank $1\frac{1}{2}$ miles northward of the islets.

The channels between the islets and Luzon, to the west, and Biri island, to the south-east, $7\frac{1}{2}$ and 5 miles wide, respectively, are clear and deep.

LIGHT (Lat. $12^{\circ} 45' N.$, Long. $124^{\circ} 17' E.$).—From a white conical tower on the summit of the southern San Bernardino islet, an *alternating flashing light every fifteen seconds*, is exhibited, showing one red and one white flash alternately, with an interval of *fifteen seconds* between them; the light is elevated 215 feet above high water, 48 feet above the ground, and is visible 20 miles in clear weather.

Chart 3370, San Bernardino strait and approaches.

SAMAR.—Samar is the third island of the Philippines in point of size. It has an area of 5031 square statute miles, and a general

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

shore line of 358 miles. It is 136 miles long in a north-west and south-east direction, and its greatest width is 51 miles. Samar is moderately high, heavily wooded, and well watered. It is thinly populated, the number of inhabitants being estimated at 200,753, in 1899, by the Philippine Commissioners, and but a small part of the island is under cultivation. The principal export is hemp. There are no ports of entry, and most of the business is carried on through Manila.

NORTH - WEST COAST. — Kanaguayan islet (*Lat. 12° 22' N., Long. 124° 20' E.*), on the west coast, lies opposite the south end of Dalupiri island. Vessels of all sizes can find sheltered anchorage between it and the coast of Samar, in good depth of water and good holding ground, but the space is limited.

Loog bay.—Loog point lies three-quarters of a mile northward of Kanaguayan islet and between them is the entrance to Loog bay, which is half a mile in width, and three-quarters of a mile in depth in a north-east direction, with 4½ fathoms in the centre; there are rocks off Loog point, and the upper part of the bay is filled with reefs.

Coast.—From Loog point the coast trends N. by W. ½ W. for 4 miles to the entrance of the Mauo river.

This part of the coast forms the base of a high range of mountains covered with trees of a very dark green. The shore consists of sand and rocks, covered with mangroves down to the water's edge. At a quarter of a mile or less from the shore the depth is 10 fathoms, sand and rock.

Mauo river has a rocky entrance, the channel lying close to the wooded bluff on the northern side. The available width of the channel is diminished to about 20 yards by a reef from the south point, and the depth is 2½ fathoms at low water; close inside, a shoal with 6 feet on it projects from the village on the north bank. A sharp turn to the right as soon as the bow is inside the reef, is necessary to clear it. Above the reef there are from 3 to 5 fathoms, but only 2½ can be counted on 50 yards above. This is a snug anchorage for vessels of 9 feet draught and 140 feet long, but in protracted storms with much rain, stumps and large trees may be looked for from up river. Boats may water very expeditiously near a beautiful waterfall about one mile up the river, to which 2 fathoms may be carried.

The anchorage outside is with the river well open; depths less than 20 fathoms should be approached carefully. The ground is foul both north and south of the bank about the mouth of the river, which is very limited in extent.

Borobodiangan point, 2 miles north-westward of Mauo river entrance, is covered with high trees; the shore between the point and

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

Mauo river is bordered with a narrow reef. The tidal streams, which run at the rate of $7\frac{1}{2}$ knots at springs and 4 knots at neaps, strike the point with great force, producing violent eddies.

Lipata point $3\frac{3}{4}$ miles north of Borobodiangnan is high and rocky. A reef of sand and rock covered by 5 feet of water, projects from the point.

Anchorage.—There is good anchorage during the north-east monsoon in the open bay of Kinagitnan, one mile south-eastward of Lipata point, the depth of water in the northern part is from 13 to 27 fathoms; and in this same part of the anchorage there is a good stream from which water may be obtained. Vessels may also anchor off the ruins of the town of Allen, formerly La Granja, about a mile southward of Kinagitnan, half a mile from the shore, in 10 fathoms, sand, with patches of coral. This is not a good anchorage in bad weather.

Coast.—From Lipata point the coast trends north-north-westward for $1\frac{1}{2}$ miles to Malalimon point and then north-north-eastward $2\frac{1}{2}$ miles to Balicuatro point, and is fairly clean and bold, but two rocks, awash at low water, lie 3 cables off-shore at about half a mile northward of Malalimon point.

Balicuatro point (*Lat. $12^{\circ} 35' N.$, Long. $124^{\circ} 17' E.$*), the north-west point of Samar, is clear and steep-to, the reef which fringes it on both sides being narrow. The point rises to a hill, 700 feet high, about $1\frac{1}{4}$ miles southward, and is covered with heavy timber. Mount Lipata, 2 miles south of Balicuatro point, rises to a height of 750 feet.

North coast.—From Balicuatro point the coast trends in a general easterly direction for 49 miles, to the eastern entrance to Port Palapag, and is fronted by numerous islands, banks, and shoals. This stretch of coast is exposed to the full force of the north-east monsoon, which blows at times with the full force of a gale, and is accompanied by much rain and a very heavy sea; at this season of the year there is no safe anchorage between Biri channel and Port Palapag, and it is frequently impossible to communicate with the towns of Bobon and Katarman.

BALICUATRO ISLANDS lie northward of the north-west part of Samar.

Biri (Viri) island, the largest and northernmost of the group, lies with its north-west extremity about 8 miles north-eastward of Balicuatro point. It is about 4 miles long north-west and south-east, 2 miles wide, and 280 feet high. Biri head, the north-west point, is a rocky perpendicular bluff, 200 feet high, clean, and steep-to, and is a conspicuous landmark when approaching San Bernardino strait from

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

the north-eastward. About a quarter of a mile eastward of Biri head a steep-to coral reef begins, which continues along the north-east and east sides of the island, and also surrounds all the islands lying east and south-east of Biri island. On the outer edge of this reef, which dries at low water, are a series of islets of limestone formation, from 10 to 120 feet high, which are distinctive features in this locality. With the exception of the two ends of the island and these outlying islets on the north-east and east sides, the shore line is low and fringed with mangroves. On the west side is a low bluff and gravel beach most of the way. A reef with three islets on it projects 6 cables from the south-east end. The interior of the island is covered with heavy timber, some of the trees being very large. Most of the inhabitants live on the west side of the island.

Rocks.—About half a mile east-north-eastward from Biri head is a rock 20 feet high, and about three-quarters of a mile southward from the head and about 4 cables off-shore is a rock 15 feet high, surrounded by a small coral reef, with a depth of one fathom at its northern end.

Makarite (Barin) and **Kagnipa islands** are small, and lie south-westward of Biri island, from which they are separated by narrow channels.

Anchorage.—Protected anchorage may be found in about 20 fathoms between the north end of Kagnipa and Makarite, but it is not recommended, as the bottom is rocky and the tidal streams strong.

Talisai, Magesang, Makadlao, Tinau, and a number of small unnamed islets and rocks lie east and south-east of Biri island; they and Biri all lie on one great reef, a large part of which dries at low water.

Anchorage (*Lat. 12° 38' N., Long. 124° 24' E.*).—There is a small but well-protected anchorage between the south end of Biri island and Makadlao island. To approach it from the Biri channel, pass about a quarter of a mile westward of a small bright sand cay lying about three-quarters of a mile off the western end of Makadlao island, steer northward, and anchor between the reefs in 15 to 20 fathoms. The edges of the reefs marking this anchorage show plainly, are steep-to, and in many places are marked by fish traps.

San Juan and Bani islands.—On the south side of Biri channel is another group of five heavily-wooded islands, which are so closely joined together by reefs as to appear to be practically one island. They are San Juan, Elonbachid, Nagnasa, Maravilla, and Bani; the first four are separated only at high tide. The outer shores are well defined, usually bold, and fringed by a narrow coral reef; the interior shores are largely mangrove swamps.

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

Biri channel, between the Balicutro islands and those just described nearer the coast of Samar, is clear of danger, and is generally used by vessels bound to the north and east coasts of Samar, but the tidal streams are very strong, the flood setting to the westward and the ebb to the eastward.

Cocoanut island, the first island eastward of Balicutro point, lies near the shore, and is low and covered with cocoanut trees. The coast from Balicutro point to Cocoanut island is high and covered with heavy timber, the points are rocky, and in most of the bights there are beaches.

Lavezares (*Lat. 12° 32' N., Long. 124° 20' E.*).—The town of Lavezares lies at the head of a bight south-south-eastward of Cocoanut island. This bight is shoal, and nearly blocked with reefs, but there is a narrow boat channel between them to the beach.

Directions.—Bring the church at Lavezares to bear S. 1° E., and steer for it, passing in between the reefs, and anchoring in from 2 to 3 fathoms. The swinging room is limited, but the holding ground is good. There are two large stakes on the edges of the reefs in 2 fathoms; small vessels should anchor outside them.

Anchorage for large vessels will be found farther out, with the church bearing S. 1° E. and the detached shoal eastward of the entrance N. 89° E.

Coast.—The coast from Cocoanut island to Baird point, at the northern part of Gilbert island, is low and largely mangrove swamp, with the exception of Cave point, which is about 300 feet high. Baird point is clean and steep-to; from here to the village of Karanian the shores are low, and fringed with mangroves.

Bani channel is a narrow channel with a depth of 13 fathoms between Bani island and Samar that is sometimes used by coasters. There are two shoals of $1\frac{1}{2}$ and $2\frac{1}{2}$ fathoms, respectively, lying half a mile from the west coast of Bani island, and should be avoided by passing west and south of them.

Gilbert island, about 2 miles eastward of Bani island, is about 3 miles in extent, and well wooded; it is separated from the coast of Samar by a narrow boat channel.

Kabaun, the easternmost island in this vicinity, is about $3\frac{1}{2}$ miles long north-west and south-east, and one mile wide. It is low, wooded, and surrounded by reef, which on the north-east side extends to nearly half a mile from the shore. The channel between the south end of the island and the reefs surrounding Bat island is over a quarter of a mile wide, deep, and free from danger.

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

Ugamut island is a small, low, mangrove-covered island lying off the south-west side of Kabaun island, from which it is separated by a narrow, impracticable channel. The space north-westward of Ugamut is full of reefs.

Green island, small, and about 100 feet high, lies between Gilbert and Kabaun islands; it is surrounded by a reef, and north and west of it the ground is foul.

Foot island, lying between Ugamut island and Samar, is small, about 10 feet high, and surrounded by a reef. There are several detached reefs between it and Green island.

Bat island, between the south end of Kabaun island and Samar, is small, low, and surrounded by a reef which extends some distance east and west of it. The usual track of vessels is northward of Bat island. The channel between Bat island and the main has not been surveyed, and is reported to be foul.

Karanian channel is a narrow channel sometimes used by coasting vessels, which usually pass south of Green and Foot islands and north of Bat island. This channel is deep, having nowhere less than 7 fathoms, but it is contracted by reefs extending from the islands and the main.

Karanian.—The village of Karanian, a regular port of call for coasting steamers, lies on the eastern shore of a small cove on the coast of Samar, facing Foot island. The cove is nearly blocked with reefs, leaving a narrow boat channel to the shore. The chart shows a pier about 2 cables in length projecting in a north-westerly direction.

Anchorage, in from 8 to 12 fathoms, over a rocky uneven bottom, may be found about a quarter of a mile southward of Foot island.

Coast.—There is a range of hills nearly reaching to the coast just eastward of Karanian, which is the only high land in this vicinity. From the beginning of the bay southward of Bat island to Bobon point the shore is low, and has a sandy beach, outside of which is the usual coral reef.

A rock, about 10 feet high, lies on a shoal, dry at low water, at $1\frac{1}{2}$ miles N. 73° W. from Bobon church, and about half a mile off-shore.

Bobon (*Lat. $12^\circ 32' N.$, Long. $124^\circ 34' E.$*) is a small town situated $4\frac{1}{2}$ miles eastward of Karanian, on the west side of Bobon point, at the mouth of the river of the same name.

From both entrance points to the river reefs project, leaving a narrow boat channel to the beach in front of the town.

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 0° 50' E.

Anchorage.—The usual anchorage in fine weather is in 9 fathoms, with the church bearing S. 61° E., distant three-quarters of a mile.

OFF-LYING SHOALS.—**Fitzgerald banks** are three banks covered by least depths of 10, 6½, and 6½ fathoms respectively, lying 5, 7, and 10 miles N. 66° E. from the highest point of Biri island. These banks are of coral formation, and are clearly indicated by their colour. The north-eastern two probably break in heavy weather.

Fisher shoal, on which the sea breaks in bad weather, is covered by a least depth of about 4 fathoms, and is about a mile in extent. From its centre Bobon church bears S. 6° W., distant 5½ miles.

A rocky patch of 4 fathoms lies 3 miles eastward of Bobon point, and more than a mile off-shore, outside the 10-fathoms line.

Chart 2577, Between San Bernardino and Mindoro straits.

Wright shoal, on which the sea breaks heavily in bad weather, is about three-quarters of a mile in extent, with a least depth of 6 fathoms. It lies about 14 miles eastward of Biri island, and from its centre Katarman church bears S. 4° W., distant 10 miles.

A small shoal, covered by an approximate depth of 3 fathoms, lies about one mile southward of Wright shoal.

Katarman shoal (*Lat. 12° 34' N., Long. 124° 38' E.*), on which the sea breaks in moderate weather, is about 6 cables in extent, with a least depth of 3 feet; from its centre Katarman church bears S. 6° E., distant 4½ miles.

Katarman.—The town of Katarman is situated about 5 miles eastward of Bobon, on the west bank of the Katarman river. It lies about half a mile back from the beach, and is nearly obscured by trees, only the roofs of the houses being visible from the sea. The western side of the river mouth is formed by a long sand spit, which is reported to shift considerably during the north-east monsoon. From the shore immediately eastward of the river, two coral reefs, partly dry at low water, extend about a quarter of a mile northward, leaving a break between them where small boats may land when it is too rough to enter the river or land on the beach in front of the town. Maguran reef, a large coral reef, dry at low water, lies northward of the above break, and protects the landing in bad weather.

The channel across the bar into the river is very narrow, and has a depth of 7 feet at low water, and there is very little water in the river. In fine weather small launches may enter at high water by keeping close to the end of the sand spit to starboard, and turning sharp with port helm when it is abeam to avoid rocks to port inside the entrance.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Anchorage.—The usual anchorage off Katarman is in about 5 fathoms, sand, about half a mile north-westward of the mouth of the river. To pass eastward of Katarman shoal, bring Katarman church to bear S. 6° W. when about 5 miles distant and steer for it. This anchorage is frequently untenable during the north-east monsoon, which sends in a very heavy sea.

Coast.—From the mouth of the Katarman river to Livas point the western entrance point of Laoang bay, the coast presents few distinctive features. It is heavily wooded to the water's edge, and traversed by low ridges, which seldom rise above an elevation of 300 feet. There are no prominent peaks and very few landmarks.

From the Katarman river to Bugtu point the shore is fronted by numerous coral reefs. The village of Kawayan lies on the eastern side of the entrance to the Katarman river, and farther eastward are the village of Makinalo, the town of Mondragon, and Bugtu village—all small. The Bugtu river, a small stream, discharges just westward of Bugtu point.

Bugtu point is surrounded by coral, dry at low water, which extends nearly half a mile northward. From the point the coast trends eastward, and then curves round northward and north-westward to Oot point, forming Bantayan bay, 4 miles wide and 2½ miles deep; the villages of Bantayan and Lauangan lie on the shores of the bay. In Bantayan bay there are anchorage depths of from 4 to 8 fathoms at less than a mile from the shore.

Oot point (*Lat. 12° 35' N., Long. 124° 51' E.*) is a long, low, sharp point projecting north-westward. Its extremity is a mangrove swamp bordered by a reef to a distance of about 3½ cables. From Oot point the coast trends eastward with a curve southward for about 6 miles to Livas point.

Plan of Port Palapag and Laoang bay on 2395.

Pambuhan.—The town of Pambuhan lies on the eastern side of the entrance to the river of the same name, about 2 miles south-west of Livas point. The church forms a fairly good landmark.

Anchorage may be found off Pambuhan in about 6 fathoms, sand, about half a mile northward of the church. To approach the anchorage, when about 3 miles off, bring the church to bear South and steer for it, anchoring according to draught.

Livas point, the western entrance point of Laoang bay, is low, wooded, and fringed with reefs. A large detached reef, dry at low water, with rocks on it 2 feet high, lies with its northern extremity 1½ miles north-westward of Livas point.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E.

Hirapsan islet, situated about 3 miles east-north-eastward from the mouth of the Katarman and one mile off-shore, is only 10 or 12 feet above mean high water, but the trees are tall and dense, giving the appearance of being higher than it is.

Palihon islet, lying about one mile north-westward of Hirapsan, is simply a mangrove swamp, all the ground being covered at high water. Hirapsan and Palihon lie on a reef, 2 miles long north-west and south-east, which dries at low water between the two islets. Fairly good anchorage, protected during the north-east monsoon, may be found westward of Hirapsan islet.

Kahoagan islet, lying about $3\frac{1}{2}$ miles north-westward of Oot point, is small, and surrounded by a reef, beyond which shoal water extends north-westward one mile from the island.

Reefs and shoals.—Within the area bounded by Hirapsan, Palihon and Kahoagan islets, and Bugtu point, there are a number of dangerous reefs and shoal patches, the position of which will be best understood by reference to the chart; this area must be navigated with caution.

Plan of Port Palapag and Laoang bay on 2395.

Villalobos reef (*Lat. $12^{\circ} 40' N.$, Long. $124^{\circ} 56' E.$*).—A reef about half a mile in extent within the 10-fathoms limit, and having a least depth of 2 fathoms over it as charted, but said to be $4\frac{1}{2}$ fathoms, and which breaks heavily in the north-east monsoon, lies N. 5° W., $6\frac{1}{4}$ miles from Pambujan church, with the northern side of Kahayagan island bearing East.

Chart 2577, Between San Bernardino and Mindoro straits.

Winds.—**Verde island passage to San Bernardino strait.**—The south-west monsoon generally begins about the middle or end of April, with winds from south-west and west, which at times blow fresh, and alternate irregularly with north-east winds. They are first felt in the part included between Verde island passage and the meridian of Marinduque island, and in this part they blow stronger than the variable winds from north to south, through east, that are experienced further to the eastward, and which are accompanied by thick weather and heavy squalls.

In April and May the winds are variable from north to south, through east, with thick weather, rains, heavy squalls, and occasional calms; this weather continues through June until the south-west monsoon becomes established in the neighbourhood of Verde island passage.

In general, the south-west monsoon becomes established in all its force during June, and blows from S.S.W. to West, reaching at this time as far eastward as Marinduque island.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

In some years the south-west monsoon is limited to the few gales from the westward alternating with the variable breezes from the eastward, which facilitate entering the strait from the eastward. In other years it attains its full force in May, and in this case the south-west winds are less permanent from June to September, and are replaced by longer intervals of variable breezes.

The north-east monsoon commences towards the end of September or beginning of October. During September the wind blows alternately from north-east, south-east, or south-west, but with most persistence from south-west; during the interval of change there are light winds, calms, and tornadoes.

During October, November, and the early part of December the monsoon blows with strength from north and north-east, accompanied by thick weather and rains. This is the worst season of the year for navigating the strait, on account of the bad weather and the occurrence of typhoons. After the middle of December the gales cease, and the winds blow strong from north-east, east, and east-south-east, with much thick weather and rain until the March equinox, from which time until the monsoon ends the winds vary from north to south, through east, sometimes blowing with force, and at other times light with variable airs and calms.

Typhoons are more prevalent in the months from June to November, inclusive, and one-fifth of all the typhoons occur in September. The signs preceding these storms, and the description of them, will be found in Chapter I., *see* page 12.

Tidal streams.—In the absence of more definite information, the points on which pilots are mostly agreed are:—That from the eastern mouth of the strait to about the meridian of Bondog point (*Lat. 13° 10' N., Long. 122° 36' E.*) the flood stream sets westward, and the ebb eastward; and that from that meridian to the Verde island passage the reverse of this takes place. That, from the eastern mouth of the strait to the above meridian, the stream of flood runs longer than that of ebb in the north-east monsoon, the reverse being found in the south-west monsoon, and the opposite condition to this is found from Bondog westward.

The tidal streams set through the strait with great force, attaining a velocity of 4 to 8 knots an hour in the narrow passages between the islands, and causing strong eddies and whirlpools among them. After passing the strait the streams spread out in either direction, and lose their force, the flood following the passages between Samar and Masbate to the southward, and between Luzon and Masbate to the northward, losing its force as it advances westward and encounters the stream which has entered through the western channels.

General charts 943, 1263.

Charts 3368, 3370. Var. 0° 50' E.

Tides.—At San Bernardino islets the tide is semi-diurnal; the mean high-water interval is 5 hours 56 minutes, and the mean low-water interval 12 hours 22 minutes. The mean range of tide during two months' observations was 2·8 feet, and the maximum range about 4 feet.

Charts 3370, 2577.

DIRECTIONS for SAILING VESSELS TAKING THE STRAIT of SAN BERNARDINO DURING the S.W. MONSOON.—**From West to East.**—To pass out to the eastward from a position south of Marinduque, a course should be steered to make the north-west point of Masbate island, to avoid being embayed with a south-west wind in the Boca Engañosá (*Lat. 12° 50' N., Long. 123° 14' E.*) of Burias island. A mid-channel course should be steered between Burias and Masbate, and when the south-east point of Burias is passed steer a N.E. course to pass north of Tikao, giving San Miguel island, off the north point of Tikao, a good berth on account of the strength of the tidal streams near it.

If the wind is settled, vessels should steer for San Andres island, the north-western of the Naranjos isles, and thence pass midway between Kapul island and the Tiklin islands, proceeding out of the strait between San Bernardino islets and Biri island off the coast of Samar.

If the S.W. wind is not settled, it is well to remain at San Jacinto until it is, lest calms or light winds should leave the vessel at the mercy of the tides in the strait. The best time for leaving the port is at half-flood, for then a vessel is likely to get the first of the ebb when she is near Naranjos islands. In steering a course, attention should be paid to the set of the tide.

If carried into the neighbourhood of Kalantas bank, it would be well to make for the coast of Luzon, where anchorage may be had, or to anchor on the bank in good time. The navigation of the strait requires great care, and an anchor should always be ready to let go.

From East to West.—When entering the strait from the eastward in the S.W. monsoon, a vessel should work to windward with the flood stream, and, when this loses its strength, should make for the bank north-west or west of Biri island, where anchorage can be had on sandy bottom until the tide makes again. On weighing, a vessel should work according to the direction of the stream, so as to pass between Kapul and Dalupiri islands, or between this last and Samar.

If the tide should turn before a vessel has entered these passages she cannot do better than make for Kinagitnan bay, south of Lipata point, in Samar. Anchorage can also be had, if necessary, in the

General charts 2577, 943, 1263.

Chart 3370, San Bernardino strait and approaches. Var. 1° E.

channel on either side of Dalupiri, on a sandy bottom strewn with big stones.

The only danger to guard against at this part is the Diamante rock; this once passed, a vessel can take either the passage between Naranjos islands and Kapul, or between the Naranjos and Destacada. This latter route is the best, shaping the course then to pass round the north end of Tikao island.

WEST COAST of SAMAR.—The part of the coast between Balicuatro point, the north-west extremity of Samar, and Kanaguayan island, some $13\frac{1}{2}$ miles to the southward, has been included in the description of San Bernardino strait. From Kanaguayan island the coast trends southward for 3 miles to Sohoton point, just northward of which is a cove with a depth of 4 fathoms near the shore at the mouth of the Palanit river.

Sohoton point (*Lat. 12° 19' N., Long. 124° 20' E.*) is high and jagged, and has an islet of the same name off it at a distance of 50 yards.

Charts 3370, 3371.

Coast.—The coast from Sohoton point trends south-south-east for about 8 miles to Malayok point; for $1\frac{1}{2}$ miles southward as far as Maglagabon point it is rocky, thence to Malayok point it is steep-to. From Malayok point the coast trends south-eastward 10 miles to Jibatan point, and is high and clear. Taktak point, 5 miles from Malayok point, has a small reef about a quarter of a mile westward of it, and a small islet, named Binalio, lies a third of a mile south-westward of the point. Damita islet lies on the outer edge of a bank $1\frac{1}{2}$ miles N. 60° W. from Jibatan point, and about half a mile off-shore. There are $6\frac{1}{2}$ fathoms outside it, and inside there are 2 and $3\frac{3}{4}$ fathoms, decreasing regularly to the shore. A bank begins at Jibatan point, and widens out until it extends to a distance of $1\frac{1}{2}$ miles off the mouth of the Jibatan river, and then narrows down to a third of a mile eastward of the Kalbayok river.

Chart 3371, Libukan islands to Naro bay.

Jibatan river, with 5 feet on the bar at low water, and 12 to 29 feet inside, discharges $1\frac{1}{2}$ miles south-eastward of Jibatan point. The village of Jibatan is situated on the left bank of the river about $1\frac{1}{2}$ miles from the sea. From the mouth of the river the coast trends eastward for about 3 miles to the mouth of the Kalbayok river.

Kalbayok town and anchorage.—The town is situated on the shore in a bend of the coast on the east side of the mouth of the

General charts 2577, 943, 1263.

Chart 3371, Libukan island to Naro point. Var. 1° E.

Kalbayok river; its population in 1903 amounted to 15,895, and it is the largest town and the principal hemp-shipping port in Samar. The ruins of a long wooden wharf extend southward from the town, and form a prominent landmark. There is very little water on the bar at the mouth of the river at low water and about 5 feet at high water, when only lighters can enter. Improvements to the bar are contemplated.

LIGHT (*Lat. 12° 4' N., Long. 124° 35' E.*).—A *red fixed* light, visible 10 miles in clear weather, is exhibited, at an elevation of 55 feet above high water, from a white frame structure, 55 feet high, on the beach at the south-east entrance point of the Kalbayok river.

Anchorage.—Shoal water extends off some distance in front of the town, the 5-fathoms curve being more than a mile southward of the light. Large vessels are advised not to go closer in, as the depths are irregular, and in some places the water shoals rapidly.

Sailing vessels, to avoid a lee-shore during the south-west monsoon, seek a sheltered anchorage in 12 or 14 fathoms in a bay on the north side of Libukan dako island, and transfer their cargoes by small sailing lighters. Steam launches also sometimes seek shelter there and also in Santo Nino bay, 12 miles south-westward of Kalbayok, on the north side of Limbankauayan island. Steamers from Manila call at Kalbayok fortnightly.

Telegraph.—Kalbayok is a telegraph station. Cables from Port Palanog and Katbalogan are landed here.

Tides.—It is high water, full and change, at Kalbayok, at 11h. 13m.; springs rise 4 feet.

Charts 3371, 2987.

Coast.—From Kalbayok the coast trends S.E. for 24 miles as far as Katbalogan, and is broken up into bays with but little depth of water in them, and exposed to the south-west winds.

From Kalbayok for 12 miles south-eastward the shore is low and intersected by small streams. This section of the coast is very imperfectly surveyed, and little is known in regard to it. The water is shoal some distance off it.

The Gandara river, the principal river in this vicinity, discharges about 10 miles south-east of Kalbayok. It is reported to have 4 feet on the bar at low water and deeper water inside. Launches cross the bar at low water and ascend to a considerable distance. The approach to the bar is long and intricate, and should not be attempted by a stranger unless the channel is marked.

There are no towns of any importance on this part of the coast. Taragnan is a small port, situated behind Fronton Taragnan, a prominent headland.

General charts 2577, 943, 1263.

Charts 3371, 2987. Var. 1° E.

The Tagdaranas islets, two in number, lie about half a mile north-north-west and south-south-east from each other, at one to 1½ miles westward of Fronton Taragnan. The water between them and the coast is shoal, but their western sides have 7 fathoms near them.

Chart 2987, San Pedro bay to Libukan islands.

THE LIBUKAN ISLANDS are a group of three islands and several smaller islets lying about 4 miles off the coast of Samar.

Libukan dako (*Lat. 11° 54' N., Long. 124° 39' E.*), the largest of the group, is of very irregular shape, 2½ miles long north-west and south-east, and 554 feet high. There is good anchorage in a bay on the north side of the island in 12 to 14 fathoms, soft mud, and vessels on the coast make for this anchorage when the south-west gales called *collas* begin to blow.

Libukan gutiai and Tangad Libukan are too small islands lying about a quarter of a mile west and less than a mile north-westward, respectively, of Libukan dako.

Kuro Koaian islets are three small rocky islets about half a mile from the south-west side of Libukan dako.

Laia laia islets are two rocky islets connected by a reef which dries at low water, lying one mile south-eastward of Libukan dako.

DANGERS.—**Urai Vanoa rocks**, awash at low water, lie 8 cables south-westward of Libukan gutiai.

Lunod rock, awash at low water, lies 9 cables S. 60° W. from the south-east point of Libukan dako.

Dapdap reef, awash at two points, with only a few feet depth in the space between them, is reported to exist 2 miles southward of the southern point of Libukan dako. A depth of 7 fathoms is charted a quarter of a mile eastward of the reef.

The ground in the vicinity is evidently very irregular, and being very imperfectly surveyed, must be navigated with great caution.

Kambidsos islets are two moderately high rocks lying one mile north of the largest Kanahauan island.

Plan of Kanahauan islands on 970.

THE KANAHUAN ISLANDS are a group of two large and several smaller islands lying from 4 to 7 miles from the coast of Samar. They offer good anchorages among them, sheltered from all winds.

The passages between the islands and banks that compose the group are safe and deep, and afford easy access to these anchorages, which is a fact all the more important, in that the neighbouring coasts have no harbours. Mount Kamalik, the eastern summit of Kanahauan

General charts 2987, 3371, 2577, 943, 1263.

Plan of Kanahauan islands on 970. Var. 1° E.

dako, is 446 feet high, and the highest of Timpasan 489 feet; the other islands are from 203 to 387 feet in height.

Borobaloto island, the westernmost of the Kanahauan islands, is situated $6\frac{1}{2}$ cables N. 36° W. from the western point of Timpasan island, and $7\frac{1}{2}$ cables south-westward of Tangad island. It is small, flat, and about $2\frac{1}{2}$ feet above the level of the highest tides. The channels between it and the other two islands named are clear and deep.

Anchorage.—The general depths within the islands of the group are from 15 to 20 fathoms. The best anchorage is in the little Port of Aguirre (*Lat. $11^\circ 49'$ N., Long. $124^\circ 40'$ E.*), on the east side of Timpasan island, and near the south-west point of Kanahauan dako. The southern entrance to this port, between Batgongon and Timpasan islands, is one cable wide, and 7 fathoms deep; the northern entrance is only $2\frac{3}{4}$ fathoms deep, as charted, but the least water is said to be $3\frac{1}{2}$ fathoms at half-tide. In the channel entering from the eastward there are said to be not less than 14 fathoms until the centre of the port is reached; close southward of Kanahauan dako, between it and the small islet to the southward where the chart shows shoal water, the least depth found was 4 fathoms. The port itself is very small, the anchorage area being about 2 cables wide, with a depth of 9 to 11 fathoms in the middle; near the shore the depth is 2 to 3 fathoms. The channels leading to this anchorage are narrow and crooked.

Large vessels may find protected anchorage between Kanahauan dako and Batgongon islands in 15 or 16 fathoms, mud, care being taken in entering to avoid a small patch with $3\frac{1}{4}$ fathoms on it, lying about half a mile westward of the south end of Boloang island, the eastern island of the group, and also two rocks awash lying northward of the northern island of the Kavantiguianes group.

As these islands lie but 12 miles from Katbalogan and 15 miles from Kalbayok, both towns on an open coast, Port Aguirre affords an excellent harbour of refuge for vessels at those places.

Kavantiguianes islets, small and 138 feet high, lie from one mile to $1\frac{1}{2}$ miles southward of Boloang island, the easternmost of the Kanahauan group. At $1\frac{1}{2}$ and $3\frac{1}{2}$ cables north-north-westward from the northern islet rocks awash are charted.

Plan of Katbalogan, Buri, &c., on 1622.

Buri island, lying $2\frac{3}{4}$ miles north-west of Katbalogan, is only separated from the coast of Samar by a narrow channel one-quarter of a fathom in depth. There is confined anchorage on the eastern side of the island at the distance of 2 cables from the shore, in a depth of $3\frac{1}{2}$ fathoms; on the eastern side of this anchorage is a small reef

General charts 2987, 2577, 943, 1263.

Plan of Katbalogan, Buri, &c., on 1622. Var. 1° E.

marked by a beacon on its southern end. About $3\frac{1}{2}$ cables southward of the beacon and eastward of the summit of Buri island there is anchorage in about $4\frac{1}{2}$ fathoms at 3 cables from the shore; and also on the north side of the island at $2\frac{1}{2}$ to 4 cables from the shore, in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms. Masasungiao islet lies a quarter of a mile from the north-west part of Buri, and is connected with it by a reef dry at low water.

The two Kagdullon islands standing on the same reef, 8 cables long east-north-east and west-south-west and 3 cables wide, are situated $1\frac{1}{2}$ miles west of the south end of Buri island; the Marisan and Kandongos reefs lie between. The channel between the islands and Marisan reef is half a mile wide with 11 fathoms in the middle.

Dangers in approach to Katbalogan.—**Lutao reefs**, situated in the approach to Katbalogan, are two small dangerous reefs, partly awash at low water, with a narrow 3-fathoms channel between them; the reefs, with the bank upon which they stand within the depth of 5 fathoms, occupy a space $1\frac{1}{2}$ miles in length east and west, and a quarter of a mile in width.

Buoys.—A red conical buoy is moored in $7\frac{1}{2}$ fathoms off the north-west end of Lutao reefs, and the south-eastern edge of the shoal extending eastward from the reefs is marked by a black can buoy in $3\frac{3}{4}$ fathoms.

Pamuntangan reef, 3 cables in length, east and west, with a breadth of one cable, lies with its outer end about 7 cables westward of Aguada point.

Buoy.—The western end of Pamuntangan reef is marked by a red conical buoy, in 4 fathoms.

Kinituai reef.—**Buoy.**—Kinituai reef, partly awash at low water, lies $1\frac{1}{2}$ miles south-west of Katbalogan and 4 cables north-westward of the northern Darahuay island.

A red conical buoy, in about 5 fathoms, marks the northern edge of Kinituai reef.

Darahuay islands, lying about $1\frac{1}{2}$ miles southward of Katbalogan, are two small wooded islands, forming, with Kinituai reef to the north-west, a chain $1\frac{1}{2}$ miles long north-west and south-east, and 4 cables in width. There is a good 4-fathoms channel between them and the coast which affords fairly sheltered anchorage.

LIGHT (*Lat. 11° 47' N., Long. 124° 52' E.*).—A red fixed light, 100 feet above high water, and visible 12 miles in clear weather, is shown from a white concrete pillar, 24 feet high, situated on a low hill

General charts 2987, 2577, 943, 1263.

Plan of Katbalogan, Buri, &c., on 1622. Var. 1° 0' E.

near the north point of the Katbalogan river entrance. For arc of visibility, *see* Light list and charts.

Anchorage.—The most convenient anchorage is about $3\frac{1}{2}$ cables from the shore, in a depth of $4\frac{1}{2}$ fathoms, with the southern pier bearing E. by N. and Jesus point N.W. $\frac{3}{4}$ N.; or anywhere in front of the town, according to draught. In the south-west monsoon an unpleasant sea is said to set in.

In bad weather vessels can proceed by the passage between the shoals and the shore to a more secure anchorage, in a depth of 5 to 7 fathoms, under the islands Darahuay and Majaba, which lie $1\frac{1}{2}$ miles and $3\frac{1}{2}$ miles, respectively, southward of the town.

Directions.—Vessels may approach to Katbalogan by the channels north and south of Lutao reefs, or by the channel between Darahuay islands and the main. Katbalogan light over Jesus point, bearing East, leads through the North channel, the least depth in which is 5 fathoms on a small patch of mud in the middle; when Anas point bears North, steer E.S.E. for the anchorage.

To approach by the South channel, passing southward of Lutao reefs, bring Katbalogan light to bear N.E. $\frac{3}{4}$ E. before the larger Kagdullon island bears N.W. Steering for the light on this bearing will pass midway between the buoys on the Lutao and Pamuntangan reefs, and when off the town anchor as convenient.

To approach by the Darahuay channel, vessels should pass about a quarter of a mile eastward of the Darahuay islands, and continue about N.W. until Katbalogan light bears N.E. $\frac{3}{4}$ E., when it may be steered for and anchorage taken up as before directed.

KATBALOGAN (*Lat. 11° 47' N., Long. 124° 53' E.*), the capital of the province of Samar, stands on the shore of a small bay at the mouth of the Katbalogan river. It is a regularly built town of about 7,758 inhabitants (in 1903), with a sea-face of half a mile, and carries on a trade with Manila, chiefly in hemp and cocoanut oil. The bay, which is open to the south-west, has a depth of 7 fathoms at a distance of $1\frac{3}{4}$ miles from the shore, towards which it shoals gradually, and is fronted by the Lutao and Kinituai reefs. The town offers few resources. Steamers call fortnightly at Katbalogan.

Telegraph cable.—Submarine cables are laid to Katbalogan from Kalbayok and Karigara. Katbalogan is a telegraph station.

Storm signals are displayed near the river entrance.

Tides.—It is high water, full and change, at Katbalogan, at 11h. 18m.; springs rise 5 feet. The flood stream sets north-westward, and the ebb south-eastward.

General charts 2987, 2577, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands.

Maqueda bay, the great indentation south of Katbalogan, is of little value to navigation; it is shallow, and only practicable for coasters. Majaba and Basiao are small high islands lying at the mouth of Maqueda bay. Majaba island offers sheltered anchorage on its eastern side, in 6 fathoms. A reef awash named Kambalot, with deep water on either side, lies between Majaba and Buad islands; and a reef covered by $1\frac{1}{2}$ fathoms of water lies $3\frac{1}{2}$ cables S. 16° W. from the south-east point of Majaba and a quarter of a mile from the north-east point of Buad island.

Parasan island, lying 7 miles west-south-west of Katbalogan, is $2\frac{3}{4}$ miles long north-north-west and south-south-east, with a greatest width of 2 miles; off the northern part is a remarkable peninsula, connected to the rest of the island by a very narrow isthmus. Parasan island is separated from the eastern side of the north end of Daram island by a very narrow channel.

A small islet named Tara tara lies half a mile north-north-eastward of the north-east point of Parasan, and a patch of $5\frac{1}{2}$ fathoms, mud bottom and steep-to, lies one mile east of the eastern extreme of Parasan island.

Plan of Parasan harbour on 1622.

Parasan harbour, on the south side of the island of the same name, is a small well-sheltered harbour with 15 fathoms, mud, in the centre; small craft can go farther up the harbour, and anchor in 11 fathoms. The anchorage can be easily approached from the eastward; the northern entrance has a least depth of $2\frac{3}{4}$ fathoms, and is 75 yards wide at the narrowest part.

The village of Parasan is at the head of the harbour.

Chart 2987, San Pedro bay to Libukan islands.

Daram island is 13 miles long north-north-west and south-south-east, and 5 miles wide in its broadest part, narrowing to 2 cables only towards the middle of the island. It is of very irregular outline, the shore being indented by numerous bays, in some of which there is good sheltered anchorage.

The land immediately northward of the isthmus rises to a height of 1,197 feet, and that southward to a height of 1,480 feet. Off the south end of Daram island are the two Baksal islands; they are both clean, and rise to a height of 479 feet.

The channel between Daram and Samar islands, sometimes used by small steamers, has a least depth of $3\frac{1}{4}$ fathoms and a least width of a quarter of a mile.

Buoy (*Lat. $11^\circ 34'$ N., Long. $124^\circ 51'$ E.*).—A red conical buoy is moored in 4 fathoms $1\frac{1}{2}$ cables N. 61° E. from the south-east point of

General charts 2987, 2577, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

Aokon island. Westward of the buoy is a knoll covered by 5 feet of water, and between the buoy and the north point of Aokon island a part of the reef has only 3 feet on it. Eastward of the buoy the depth in the channel is from 4 to 7 fathoms.

Buad island, lying eastward from Daram island, is 6 miles long north-north-west and south-south-east, and $3\frac{3}{4}$ miles across in the centre; it is of very irregular shape, and rises to a peak 1,155 feet high. There is a sheltered port on the southern side, with a depth of 4 fathoms. Zumarraga, at the south-west end of Buad, is sheltered by high hills, with a roomy anchorage for vessels of deep draught, and may be approached either from north or south.

There are numerous small islands of irregular shape in this vicinity; their position will be best understood by reference to the chart.

A small coral patch with a least depth of 6 feet over it lies in Buad channel, about $3\frac{3}{4}$ cables north-westward from Liogliog point, on Lintarkan island.

Coast.—From the south end of Daram island to the entrance of Hanabatas channel the distance is about 4 miles. The coastline is very irregular, but the shore is clean and bold.

Shoal.—A shoal (Busuanga, 1903), with a depth of 6 fathoms over it, is situated in the approach to Hanabatas channel, $6\frac{1}{4}$ miles N. 71° W. from Kananai lighthouse.

General charts 2577, 943, 1263.

CHAPTER IX.

EASTERN COAST OF THE PHILIPPINE ISLANDS ; NORTH AND
EAST COASTS OF LUZON.

VARIATION IN 1911.—Nearly stationary.

LUZON.—Luzon is the largest island of the Philippines, and, after Java, the most fertile and populous of the Malay Archipelago. It extends from north to south with a curve towards the south-east, between the parallels of $18^{\circ} 40'$ and $12^{\circ} 32' N.$, and has a length of about 460 miles, with a width varying from 8 to 120 miles. It has a very irregular outline, with a length of general shore line of about 1,946 miles and an area of about 40,969 square statute miles. Ranges of mountains running in general parallel with the length of the island give it a mountainous character. North of latitude $16^{\circ} N.$ there are two chains, an eastern and a western, separated by the great valley of the Kagayan river. The eastern range, known as the Sierra Madre, is continuous and lofty, and forms a bold and almost inaccessible shore exposed to the full force of the north-east monsoon and the waves of the Pacific. There are a number of isolated volcanic peaks in southern Luzon; some of these are still active, and Mayon volcano, 7,943 feet in height, is probably the highest mountain in Luzon.

The population of Luzon at the census of 1903 was 3,798,507.

The south-west coast of Luzon is described in Chapter V., and the south coast in Chapter VIII. For a description of the west coast the mariner is referred to the China Sea Directory, Vol. II. (old series) or Vol. IV. (new series).

Chart 2454, N. portion of Island of Luzon. Var. $0^{\circ} 10' W.$

NORTH COAST OF LUZON.—**Cape Bojeador** (*Lat. $18^{\circ} 30' N.$, Long. $120^{\circ} 34' E.$*), the north-western extremity of Luzon, is about 300 feet high near the lighthouse, sloping down to the shore, and rising south-eastward to a mountain ridge, with summit bare of trees. It is surrounded by a reef which extends about $1\frac{1}{4}$ miles seaward, and vessels should give the cape a good berth.

LIGHT.—A *white flashing light every minute*, the duration of the flash being *fifteen seconds*, visible 26 miles in clear weather, is

General charts 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 10' W'.

exhibited, at an elevation of 386 feet above high water, from a white octagonal tower, 65 feet high, on the summit of a hill, 1,750 yards eastward of the extreme of Cape Bojeador. The dwellings near the lighthouse are also white. For arc of visibility, see Light list and chart.

Banguì bay.—From Cape Bojeador the north-western extremity of Luzon, the coast trends in a north-east direction 6 miles to Negra point, a black rocky point, on the east side of which anchorage may be obtained during southerly winds. The deep bay named Banguì bay, between this point and Dialao point, about 10 miles east-north-eastward, has also anchorage off Banguì, at the head of the bay. Dialao point, the eastern extreme of this bay, is low, rounding, covered with trees, and fringed by a narrow reef and a bright sand beach. Behind it is a small but prominent ridge 500 to 600 feet high, parallel to the coast, almost bare of trees and reddish in colour. This is the only reddish ridge in the vicinity, and is visible for a considerable distance. There is much foul ground in the eastern part of Banguì bay, and there is a shoal with less than 6 feet water about one mile south-west of Burayot point $2\frac{1}{2}$ miles within Dialao point.

Negra point and the coast for $2\frac{1}{2}$ miles eastward is rocky and fringed with reefs; thence to Burayot point the shore is low, with a sandy beach.

The town of Banguì, lying close to the beach at the head of the bay, is not visible from the sea, being completely obscured by trees.

Banguì is a telegraph station.

Mayraira point (*Lat. 18° 40' N., Long. 120° 53' E.*), the north extreme of Luzon, distant about 14 miles east-north-east of Negra point, is surrounded by rocks, which extend one mile northward of the point, with a rock awash at low water at the outer end.

The lights on Cape Bojeador and Pata point in sight, lead north-westward and northward, respectively, of these rocks. About one mile south-east of the point are two rocky cones with some smaller outlying rocks.

Coast.—From Mayraira point to Pata point, 17 miles eastward, the coast forms two deep bays, and is bold and clear.

Lakaylakay point, bearing about E. $\frac{3}{4}$ S. 9 miles from Mayraira point, is a bluff steep point of white cliffs, having a mass of high land, called Patapat mountains, contiguous to it.

Claveria.—In the eastern of the two bays above mentioned, between Lakaylakay and Kabikungan points, and at the mouth of the Kabikungan river, is the small port of Claveria, containing a church and convent, with galvanised iron roofs, which are prominent objects.

General charts 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 10' W.

Anchorage may be taken up in this bay near the shore, in from 5 to 15 fathoms, sand, with shelter, except in northerly winds.

Pata point (*Lat. 18° 38' N., Long. 121° 9' E.*), 7 miles east of Lakaylakay point, is a knoll 125 feet high, with a small higher detached ridge behind it.

LIGHT.—A *white flashing light every five seconds*, visible 18 miles in clear weather, is exhibited, at an elevation of 202 feet above high water, from a small dwelling 21 feet high erected on Pata point. For arc of visibility, *see* Light list and chart.

Coast.—From Pata point the coast trends south-eastward for 43 miles, and then north-eastward for 27 miles to Cape Engaño, the north-east extreme of Luzon, forming a large bay. Fronting the sea is a considerable space intersected by rivers. On the western side is the Abalug chain of mountains lying parallel to the coast and about 6 miles inland. There is a continuous beach along this coast with regular soundings.

At respectively 14 and 15½ miles S.E. by E. from Pata point are the entrances of the San Juan Pamplona and the Abalug, two small rivers, with a low island between them; sandbanks, on which the sea breaks in bad weather, extend some distance off the mouths of these rivers; they are the only known dangers on this part of the coast.

RIO GRANDE DE KAGAYAN.—The entrance to this river is situated 14 miles south-eastward of the Abalug, and has good anchorage off its mouth. On the west side of the entrance a shoal extends out some distance northward. The point on the east side is known by the church and town of Aparri built upon it. Aparri is the principal port in northern Luzon; the population of the town was 18,252 in 1910. There is a telegraphic station at Aparri.

Steamers from Manila call here fortnightly.

LIGHT.—At Linao point, on the west side of entrance, a *white flashing light* is exhibited, showing a flash *every second*, elevated 37 feet above high water, and visible 11 miles in clear weather. For arc of visibility, *see* Light list and chart.

The lighthouse is cylindrical, 30 feet high, with light-keeper's dwelling, all painted white.

Buoy.—A red conical buoy is moored in 10 fathoms north-eastward of the foul ground on the western side of the entrance to the Kagayan river, about 2 miles north-east of the lighthouse on Linao point. The buoy is liable to drift.

General charts 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 10' W.

The bar at the mouth shifts with the currents caused by the river and winds, but it generally has 16 feet over it. The bar should not be attempted without the assistance of a pilot.

Pilots.—Pilotage is compulsory for merchant vessels, and pilots are always in attendance; they can be had by hoisting the signal, and they board vessels off the mouth of the river. A pilot should always be employed. Vessels awaiting a pilot may drop an anchor under foot or keep under way, taking care to keep Linao lighthouse southward of West and the church southward of S. 30° E.

Anchorages.—The best anchorage outside is with the church bearing South, distant about 2 miles, and Linao lighthouse bearing from S. 65° W. to S. 70° W., in 10 or 12 fathoms, sand and mud. Vessels may anchor nearer the shore, but not in less than 4 fathoms. The usual anchorage for vessels after entering the river is in the western channel opposite the town. The eastern channel in front of the town can be entered only by launches and small boats, and usually only from up-stream. A depth of 12 feet can be carried up the river for 13 miles to Lallo, which is the head of navigation for sea-going vessels. The tide ebbs and flows as far as the mouth of the Rio Chico (*Lat. 17° 58' N., Long. 121° 33' E.*), about 30 miles from the sea, to which place 6 feet water can be carried.

During the rainy season, August to December, the river is navigable for light-draught launches for upwards of 100 miles, but the current is strong and the channel continually changing. At times freshets occur that cause the river to rise several feet in a few hours, when it is not safe to remain anchored in the river; the velocity of the current on one occasion, during a freshet after a typhoon, was estimated at 15 miles an hour. The water is sometimes discoloured for a distance of 10 miles seaward from the river's mouth.

Tides and tidal streams.—It is high water at Aparri, full and change, at 5h. 26m.; springs rise 3½ feet. There is a regular ebb and flow, the ebb running at the rate of 2 knots during observations made in the month of January; at times it is probably stronger. The tides off the mouth of the river are irregular and strong. At times there is an under-current setting in the opposite direction to the surface current.

Coast.—Between Aparri and Port San Vicente, distant about 30 miles E. by N. ½ N., the coast recedes and forms a large bay that is said to be free from danger. From Aparri to Batulinao point, 26 miles to the east, the coast is low, with a sand beach; it then trends north-north-eastward about 8½ miles to Nulton point; depths of

General charts 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 20' W.

6 to 16 fathoms extend from one to 2 miles off the latter part of the coast.

Palauí island, 5 miles in extent and moderately elevated, lies contiguous to the north-western point of the large promontory which forms the north-eastern extremity of Luzon; the port of San Vicente is formed between Palauí and the coast. The western shore of the island appears bold and terminates southward in the high wooded bluff of Puerto point; a reef projects $1\frac{1}{2}$ miles from its eastern side, the edge of it being about half a mile from, and around the small high and wooded islet Escucha.

Cape Engaño, 56 miles E. $\frac{1}{4}$ S. from Pata point, is the north point of Palauí island. The two Hermanos islets lie off this cape, and one mile eastward of Cape Engaño lies Gran Laja islet, a low rock about 2 cables in extent.

LIGHT (*Lat. 18° 35' N., Long. 122° 7' E.*).—A white group flashing light, showing two flashes in quick succession every thirty seconds, and visible 24 miles in clear weather, is exhibited, at an elevation of 316 feet above high water, from a grey granite tower, 47 feet high, with dwelling, on the summit of the hill above Cape Engaño. The lantern is white with a red roof. For arc of visibility, see Light list and chart.

Rocks.—Mr. F. Petersen, master of the British barque *Vale of Doon*, when rounding Cape Engaño in July, 1898, observed two rocks, the outer of which stood about 20 feet above the sea. From it Escarpada point bore about S.E. by S., and Gran Laja W. by N., distant $2\frac{1}{2}$ miles.

These rocks were not seen by the captain of U.S.S. *Samar*, July, 1900, though that vessel passed several times close to their assigned position.

Anchorage.—Beacon.—Small vessels may find good anchorage in a cove south-westward of the lighthouse on Cape Engaño, protected except in north-westerly and westerly winds; to reach it steer in for a beacon, consisting of a pole, 12 feet high, with diamond-shaped top-mark, all painted white, on a S. 69° E. bearing, and anchor in 10 or 12 fathoms.

Plan of Port San Vicente on 3392.

Port San Vicente.—The outer harbour of Port San Vicente lies southward of the island of that name, and between Puerto point, the south extreme of Palauí island, on the west, and the coast of Luzon on the east. The anchorage is about half a mile in extent, with depths of from 6 to 10 fathoms, mud, good holding ground, but it is exposed to west and south-west winds.

General charts 2454, 1263.

Plan of Port San Vicente on 3392. Var. 0° 20' W.

The inner harbour is a small cove between San Vicente island and Morgan point at the south-eastern end of Palauí island, with an anchorage area of about a quarter of a mile in diameter, practically landlocked with a depth of $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, mud. The shores are fringed with reefs, which extend from one to $2\frac{1}{2}$ cables. It is an excellent typhoon harbour, and the only thoroughly protected one in northern Luzon.

San Vicente island, half a mile long north and south and 3 cables broad, lies with its southern end about one mile eastward of Puerto point, the space between being filled with foul ground and reefs, the edge of which passes one cable south of the island. Shoal water continues along the south-east side of the island, and from the eastern side a shoal, which dries one to 2 feet in places, extends eastward about 3 cables, and is marked at the outer end by a light. New Orleans point, the south extreme of the island, is conspicuous, but no description of it is given.

Nulton point, on the coast of Luzon, and about 6 cables eastward of San Vicente island, is low, with a large, white, dead tree on it.

Roña island, off the eastern entrance to the port, is low and wooded, with a white base of sand and rocks. It lies a little more than a mile N. 30° E. from Nulton point.

Dangers, western side of entrance.—Trueno shoal. the existence of which is doubtful, is charted as awash at low water in a position from which New Orleans point, the south extreme of San Vicente island, bears N. 53° E., distant a quarter of a mile. The masters of steamers using the harbour have never seen it, and the U.S.S. *Wheeling* passed over its supposed position and saw no sign of it.

Eastern side.—Buoy.—A detached reef, less than a cable in extent, with 3 feet of water on it, lies with its outer edge about 2 cables westward of Nulton point. Its western side is marked by a red conical buoy.

Light (Lat. $18^{\circ} 31' N.$, Long. $122^{\circ} 7' E.$).—A red fixed lantern light, elevated 12 feet above high water, and visible 7 miles in clear weather, is exhibited from a concrete pillar, white with black centre, erected on the eastern point of the shoal extending eastward from San Vicente island.

The channel to enter inner harbour has a depth of $6\frac{1}{2}$ to 15 fathoms, and lies between the reef in the middle of the entrance marked by a red buoy, and the shoal extending eastward from San Vicente island.

General charts 2454, 1263.

Plan of Port San Vicente on 3392. Var. 0° 20' W.

Directions.—To approach the outer harbour from the northward a vessel should not skirt Palaui island too closely. Pass three-quarters of a mile southward of Puerto point, and steer East until a high tree northward of Smith point, the south-eastern extreme of Palaui island, is in line with two small trees painted white within Morgan point, bearing N. 27° E., when steer for them, and when the south extreme of San Vicente island bears N.W. by N., anchor in 7 or 8 fathoms. Should the trees be gone, Roña and Escucha islands, in line N. 36° E., or the lighthouse on the shoal east of San Vicente island, bearing N.N.E., leads to the anchorage in the outer harbour until the south point of San Vicente island bears N.W. by N.

To enter the inner harbour, steer in with the marks given for entering the outer harbour until Smith point and the south-eastern extreme of Roña island are in line N. 43° E.; keep this mark on, which will lead between the red buoy on the east and the lighthouse on the west, and round the latter at the distance of about one cable so as to bring the white dead tree on Nulton point astern bearing S. 51° E. Then steer N. 51° W. into the inner harbour, and when the north end of San Vicente island bears S. 72° W., anchor in $4\frac{1}{4}$ fathoms, mud.

Should the above-mentioned trees on Palaui island be gone, the lighthouse eastward of San Vicente island should be steered for on a N.N.E. bearing until Smith point and the south-eastern extreme of Roña island are in line, when proceed as directed. The last-mentioned mark also leads south-eastward of the shoal water off the south end of San Vicente island.

A current at the rate of 2 to 4 knots an hour may be expected off this point.

The eastern entrance to Port San Vicente is encumbered with rocks and shoals, and is dangerous; it certainly should not be attempted by vessels of any size. It has not been surveyed.

Anchorage (*Lat. 18° 30' N., Long. 122° 7' E.*).—There is good anchorage in the outer harbour in a depth of 7 to 10 fathoms, exposed to winds between West and S.W., with the two small white trees before mentioned in line with the high conspicuous tree, N. 27° E., or Roña and Escucha islands in line N. 36° E. and Puerto point, the southern point of Palaui island, N. 83° W. to N. 89° W. This anchorage is used by vessels when the weather is too bad for them to enter the Rio Grande de Kagayan.

Tides and tidal streams.—The mean range of tide is 4 feet. The flood stream sets north-eastward in the channel between San Vicente and Luzon, and attains a rate of from 2 to 4 knots an hour; the ebb sets in the opposite direction.

General charts 2454, 1263.

Chart 1263, China sea.

Dugway Trouin shoal.—According to the statement of M. Denier, master of the French barque *Dugway Trouin*, a shoal was passed on the 28th of May, 1875, N.E. of Luzon island. When sighted it was awash. It extended in a south-west and north-east direction, thence trending north-west for about 100 yards. The vessel passed within a distance of 2 miles, going 6 knots an hour. The shoal is charted in lat. $19^{\circ} 5' N.$, long. $124^{\circ} 50' E.$, position doubtful; M. Denier placed it in the same latitude, but in long. $124^{\circ} 43' E.$ Soundings in this vicinity show from 2,789 to 3,195 fathoms.

Anson or Clare shoal (*Lat. $17^{\circ} 34' N.$, Long. $124^{\circ} 50' E.$*).—A report from the master of the ship *Earl of Clare* states, that on the 31st of March, 1848, at noon, in lat. $17^{\circ} 50' N.$, long. $124^{\circ} 40' E.$, shoal water was discovered alongside, and the bottom was distinctly seen about 20 yards from the ship—large white shells and dark-coloured rocks. Immediately under the ship there was apparently no bottom, and the water was not discoloured as it was over the shoal. From the bottom being seen so distinctly, the shoal was considered to be very dangerous, it lying in the fair track of vessels bound from the Pelew islands to the North Bashees. The position was considered to be correctly ascertained, as sights for latitude at noon, and also for longitude, were obtained; the chronometers were found to be correct on making the land five days later.

The charted position is that in italics, and is doubtful. Soundings in this vicinity show upwards of 2,000 fathoms.

A chart of 1843 showed a shoal named Lord Anson's shoal in nearly the position given by the master of the *Earl of Clare*, and the Galleon chart in "Lord Anson's voyage" shows a shoal in the same latitude, but 5° farther eastward.

Chart 2454, N. portion of Island of Luzon. Var. $0^{\circ} 20' W.$

Coast.—From Port San Vicente the coast trends eastward for 5 miles to Escarpada point, the north-eastern point of Luzon. This part of the coast is high and bordered by a narrow reef with detached rocks.

Bank.—A bank of some extent, covered by 7 to 10 fathoms, bottom sand and rocks, extends $2\frac{1}{2}$ miles north-westward from Escarpada point; its outer end is 2 miles off-shore.

Directions.—The channel between Cape Engaño and Kamiguin island to the north-north-west is 20 miles wide, and clear of danger. As the currents set strongly to the northward in the south-west monsoon, it will be prudent for those proceeding eastward from this coast with light winds to keep on the south side of the channel, to prevent

General charts 1263, 781.

Chart 2454, N. portion of Island of Luzon. Var. 0° 0'.

being drifted northward near the Guinapak and Didikas rocks, which lie north-eastward of Kamiguin.

NORTH-EAST COAST of LUZON.—From Escarpada point the coast turns abruptly south-eastward for 12 miles to Iligan point, the most easterly point in this vicinity; between these two points are numerous small coves, well sheltered but fit only for bancas.

From Iligan point (*Lat. 18° 20' N., Long. 122° 18' E.*) the coast again turns abruptly to the south-south-west, and then curves gradually round to the southward and south-eastward, to Palanan point, the eastern entrance point of Palanan bay, which bears S. 7° E., distant 72 miles from Iligan point. The coastline forms a succession of small bays all open to the sea, with small stretches of sand beach. Immediately behind the beach steep, high mountains rise, showing no passes available for transit into the interior. The whole appearance is that of an impenetrable barrier, shutting off the east coast from the valley beyond.

Occasional rocks and shoals are found, none extending more than half a mile from the shore.

It is reported that the general trend of the coast is fairly well shown on the chart, but that the entire coastline from Iligan point to Divilakan bay is charted from 4 to 8 miles too far to the west.

Three mountains, the respective heights of which are 2,055, 3,399, and 3,917 feet, rise to the southward of Cape Engaño, at the distances of 11, 16, and 22 miles respectively, and form good landmarks in clear weather. Mount Moises, another of the range of mountains which traverses the north-east part of Luzon parallel to the coast, lies westward of Palanan bay, is 4,209 feet high, and is a good mark for the ports in its vicinity.

Divilakan bay, north of Mount Moises, is open to the northward; the shores are fringed by reefs, and there is a depth of 7 to 9 fathoms in the bay. A shoal extends northward $1\frac{1}{2}$ miles from Gay island, off the eastern point of the bay. The anchorage westward of Gay island is fairly well protected by the reef, and is reasonably safe, though exposed to the north-east monsoon.

Plan of Port of Dimalansan on chart 2454.

Port Dimalansan.—The little Port of Dimalansan, south-east of Divilakan bay, has Gay island on the western side of the entrance and Estagno island on the eastern, and penetrates $2\frac{1}{2}$ miles southward; its depth generally is 3 to 4 fathoms, but only $1\frac{1}{2}$ fathoms at the entrance, which is about $1\frac{1}{2}$ cables wide. The banks are steep and heavily wooded. Small craft with local knowledge can find perfect shelter here.

General charts 2454, 1263.

Plan of Port Bikobian on chart 2454. Var. 0° 0'

Aubarede point (*Lat. 17° 15' N., Long. 122° 24' E.*) is situated 7 miles southward of Estagno island, and forms the eastern side of Port Bikobian. Rocks and shoals extend nearly a quarter of a mile south of the point.

Port Bikobian, west of Aubarede point, penetrates $2\frac{1}{2}$ miles to the north, and the channel is from 7 to $2\frac{1}{2}$ cables wide and $5\frac{1}{2}$ to 11 fathoms deep. At the head of the port is a well-sheltered anchorage, 3 cables in diameter, with soft sticky bottom, and would be perfectly safe as a typhoon anchorage. There are two shoals near the western bank half-way up the bay; also several large rocks near the western side of the entrance, close in-shore.

Chart 2454, N. portion of Island of Luzon.

Palanan bay, 3 miles southward of Port Bikobian, is semicircular in form, about 6 miles wide and 3 miles deep, has great depth of water, and is free of dangers; but it is quite exposed to the north-east wind. A long sand beach borders the bottom of the bay, into which the Palanan river, and several small streams flow. Eastward of the mouth of the Palanan, a reef projects in a north-westerly direction for about half a mile, and affords protection to fairly good anchorage. Breakers extend eastward of Palanan point to the distance of about half a mile, and northward about one mile; this point is easily distinguished by the saddle shape of the high land. The Spanish survey ends here.

EAST COAST of LUZON.—The coast between Palanan bay and Polillo strait, 150 miles further south, has not been surveyed, and is very differently drawn on the English and Spanish charts. The part lying between Palanan bay and Digollorin river, 21 miles southward, is reported to be charted from 4 to 8 miles too far to the west.

The general trend of the coast is south-south-west, and it is stated in the Derrotero to be clean and very steep-to, and to present no off-lying dangers.

Between Palanan bay and Dinapiki point, a distance of 41 miles, a succession of open bights follow, with shoals here and there close in-shore. There are a few sandy strips of beach in the bottoms of the bights, but along the points high hills rise precipitously from the sea; in many places great caverns have been worn in the face of these high rock masses. No shelter can be found along this stretch except for small native boats.

Dinapiki point is formed by a succession of six headlands, steep-to, and without beach.

Dilasak bay (Port Tumango), is 10 miles wide between Dinapiki and Tarigtig points, and falls back a distance of 7 miles from the line joining those points.

General charts 2454, 1263.

Plan of West Dilasak bay on 3126. Var. (P 10' E.

West Dilasak bay.—There are two bights in the south-western part of Dilasak bay; the eastern bight is open to the north-east monsoon, and affords no shelter, but the western one named West Dilasak bay forms a fine harbour, penetrating $2\frac{1}{2}$ miles to the southward, and affording good anchorage, in a depth of from $3\frac{1}{2}$ to 8 fathoms, soft sticky bottom, which offers advantages as a typhoon harbour for vessels of moderate draught.

Detached rocks extend off the eastern entrance point of this bight for nearly a quarter of a mile north-eastward, and at about one mile south-west of this point there is a dangerous detached reef, about one-third of a mile in extent north-west and south-east, $1\frac{3}{4}$ cables wide, and awash at low water; there is a passage nearly 2 cables wide between it and the eastern shore, in which the depth is 4 fathoms.

The passage westward of the reef is wide and clear, presenting no difficulty, with a depth of 6 fathoms close to the north-west end of the reef.

The best anchorage, completely landlocked, in 5 fathoms, is off the south-west side of the reef, distant from it about $2\frac{1}{2}$ cables; also about 6 cables southward of the reef in $3\frac{1}{2}$ or 4 fathoms.

Hence, the bight shelves gradually to a depth of 3 fathoms at $2\frac{1}{2}$ cables from the southern shore line; two coral reefs, drying at low water, project out for the distance of 3 and 4 cables from the western beach. The rise and fall of the tide in this bight is about 8 feet.

A vessel should be steered midway between the two shores and hauled gradually to the southward to pass westward of the reef on the eastern side of the port.

Plan of Kasiguran bay on 3126.

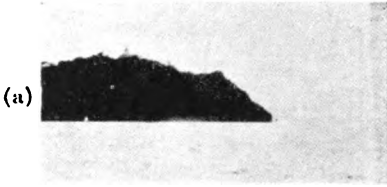
Cape San Ildefonso (Lat. $16^{\circ} 2' N.$, Long. $122^{\circ} 1' E.$), the south-west extreme of a long, high, thickly-wooded peninsula forming the eastern side of Kasiguran bay, lies 23 miles south-westward of Tarigtig point.

On the western side of the cape, about three-quarters of a mile from the extreme point, rocky ground extends to the distance of about 3 cables.

Kasiguran bay is an inlet with deep water penetrating 15 miles north-eastward within the San Ildefonso peninsula; the northern end of the bay forms an oval-shaped harbour, completely landlocked, 5 miles long north-east and south-west and $2\frac{1}{2}$ miles wide, having a depth in the centre of 20 to 23 fathoms, whence it decreases slightly towards the shores.

The eastern shore of the southern part of Kasiguran bay is bold throughout, with the exception of the rocky ground near Cape San

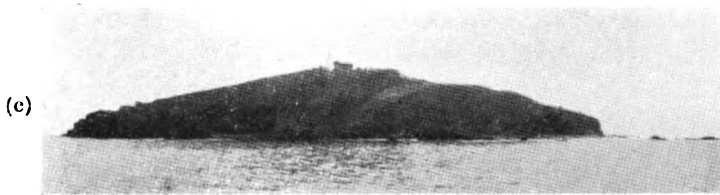
General charts 2454, 2661b, 1263.



Bugui Point, Masbate I.



Kapul Island Lighthouse.



Okata Island.



Legaspi.

Plan of Kasiguran bay on 3126. Var. 0° 10' E.

Ildefonso, previously described; the western side is not so deep, and in many places an anchorage can be had in 20 fathoms. It is not safe to go inside of 20 fathoms, as the water shoals rapidly in many places.

The entrance to the upper part of the bay, or harbour, is over half a mile wide between Sandy point on the west and the opposite shore, and presents no difficulty. A sandy spit is charted as extending nearly a cable eastward from Sandy point, and close to Bluff point, about a mile within the entrance on the eastern side, there is a patch covered by 2 fathoms. The land at the head of the bay is low and heavily wooded; the town of Kasiguran, which is small and poor, is about 2 miles from the beach, and is not visible from the water. It lies north-north-eastward from Sandy point. Wheeling peak, about 300 feet high, and $1\frac{1}{2}$ miles eastward of Sandy point, usually shows plainly against the higher hills in the background, and is useful for making the entrance.

The northern side of the inner part of the bay, or harbour, is shoal to the distance of 3 cables, when it deepens rapidly; elsewhere the shore is steep-to. Fresh water, containing organic matter but fit for boiler supply, can be obtained on the north-east side of the bay, near the mouth of a river, from a small mountain stream almost hidden by the surrounding trees.

Anchorage (*Lat. 16° 10' N., Long. 122° 0' E.*).—The harbour is free from dangers, affords excellent protection from all winds, and the anchorage is good, the bottom being generally soft clay or blue mud; the best anchorage is in the north-west part, half a mile from the shore, in a depth of 15 to 18 fathoms.

Directions.—In entering Kasiguran bay the eastern shore should be given a berth of about one mile until abreast the highest point of San Ildefonso peninsula; from here Wheeling peak should be steered for, and then a course shaped for the middle of the entrance to the inner harbour, where anchorage should be taken, as previously directed. It is not advisable to go closer in, as the soundings decrease rapidly.

Chart 2454, N. portion of Island of Luzon.

Baler bay, lying south-westward of Cape San Ildefonso. can be recognised by the high land all round the bay and up the coast as far as Kasiguran bay. Rocks, dry at low water, project north-eastward upwards of a mile from Encanto point, the southern point of the bay, and westward along the shore for about the same distance. Las Confites, at the end of the rocks north-eastward of Encanto point, is a reef that breaks at a distance of $1\frac{1}{2}$ miles from the shore. The

General charts 2454, 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 20' E.

town of Baler and its church stand back half a mile from the shore, and are hidden from vessels at the anchorage by trees.

Anchorage.—Baler bay affords anchorage at its southern part in a depth of 8 to 10 fathoms, with river mouth open and bearing about South, at about 2 miles north-westward of Encanto point. A low green hill lies a little to the westward of the anchorage.

There is also anchorage in a cove in the south-eastern part of the bay in 5 fathoms; to enter bring a stream of fresh water in the bight of the cove to bear S. 31° E. and steer for it until the depth of 5 fathoms is reached. The stream runs into the bay over a ledge of rock, and can easily be recognised. About N.E. $\frac{1}{2}$ N. from this anchorage is a patch of rocks with 5 feet over them at low water; they show dark on the surface of the water, and can be easily seen and avoided. The bottom of Baler bay is sand and rock, and is poor holding-ground.

The coast between Baler bay and Dingalan bay trends south-south-westward for about 20 miles, and presents but few salient features. A ledge runs out a short distance from Dibaiabai point, and an islet lies close in-shore in the bight between this point and Distoring Land point, southward of which latter lies Distoring islet. Half-way between Distoring islet and Dikapinisan point there is another islet, and one mile off Dikapinisan point is the islet of the same name.

Agria point (*Lat. 15° 22' N., Long. 121° 28' E.*), the northern entrance point of Dingalan bay, is bare. A range of peaks 3,000 to nearly 4,000 feet in height, extends back north-westward from Agria point, and moderately high mountains, with no prominent peaks, run parallel to the coast.

Dingalan bay is 10 miles wide between Agria and Deseada points, and extends westward about 5 miles; it is clean, with a depth of 22 fathoms in the middle of it, decreasing towards the shore. A bare rounded point, having the appearance of a broad white road leading down to the beach, projects from the west side of the bay, with ten islets, Los Carabaos, off it on the shore bank, which here extends about three-quarters of a mile off, with a depth of 3½ fathoms at the edge.

The River Dumagas, which enters the bay 3 miles southward of Los Carabaos, has a depth of 5 feet on the bar; and Umirey river within Deseada point, has 6 feet on its bar.

When making Dingalan bay from seaward, a distinctive mark for recognising the place is a conspicuous white band on the hills running

General charts 2661b, 1263.

Chart 2454, N. portion of Island of Luzon. Var. 0° 30' E.

down to the beach about 5 or 6 miles to the southward of Deseada point.

Anchorage may be found in the northern part of Dingalan bay, sheltered from north-east winds, in from 3 to 9 fathoms.

Chart 2577, Between San Bernardino and Mindoro straits.

Prueba rock (*Lat. 14° 57' N., Long. 121° 35' E.*) rises above water from a coral bank situated $1\frac{1}{2}$ miles from the main coast, and S. 77° W. of the northern point of Polillo island, as charted. Shoal water of $1\frac{1}{4}$ fathoms extends about a mile northward of the rock.

Inaguikan point, the northern entrance point of Lamon bay, lies about 38 miles south-south-eastward of Dingalan bay, as charted. It is low, and heavily wooded, with large trees growing to a height of about 50 feet, giving it an appearance of solid land when seen from a distance. The shore, for $6\frac{1}{2}$ miles to the north-westward to the mouth of the Agos river, is sandy. Tide rips are formed off Inaguikan point to the southward, and the water is highly discoloured, giving it the appearance of a reef; however, the water in the vicinity is deep, and the point may be rounded close-to.

Tidal stream.—The flood stream in this locality sets in from the northward, and is strong off the point.

Infanta.—The town of Infanta is situated about $5\frac{1}{2}$ miles north-westward of Inaguikan point, and about 2 miles from the shore. Vessels desiring to communicate with the town can find good anchorage during the south-west monsoon just southward of the mouth of the Agos river, in 6 or 8 fathoms of water, at about half a mile from the shore.

Polillo island is a large island approximately 24 miles long north and south, and from 6 to 15 miles wide, situated eastward from Inaguikan point, from which it is separated by a channel about 10 miles wide. It is of moderate regular height and well wooded. Mount Malolo, the highest point, is situated nearly in the centre of the island, and is a round-topped, wooded hill, 1,135 feet high. The north coast is faced by a wide reef which extends about 3 miles northward from the north-west point. The east coast is bordered with islands and dangerous reefs, but the west coast is clean, except before Polillo harbour, where a great reef runs out north-north-west from Polillo point, parallel to the coast, leaving a narrow channel leading to the harbour in which the depth is about 14 fathoms.

A shoal, with a depth of $1\frac{3}{4}$ fathoms, indicated by discoloured water, extends $1\frac{1}{2}$ miles from the south-west point of the island.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E.

Shoals.—Union reef, with $1\frac{1}{4}$ fathoms on it, lies $3\frac{3}{4}$ miles N. 63° W. from Polillo point, with shoal water of $3\frac{1}{2}$ fathoms extending about a mile eastward from it. Yellow rock, awash, lies $5\frac{1}{4}$ miles N. 56° W. from the point, on the western end of a ridge nearly $1\frac{1}{2}$ miles long in an east-north-east and opposite direction and one cable broad, with depths of one fathom on it. A patch of 2 fathoms lies half a mile eastward of the ridge.

Hook bay (*Lat. $14^\circ 56'$ N., Long. $121^\circ 50'$ E.*) is a small harbour situated about $1\frac{1}{2}$ miles eastward from Panangatan point, on the west side of Polillo island. It affords excellent protection for small vessels, being surrounded by high hills and completely landlocked. It is about $1\frac{3}{4}$ cables wide at the entrance, and extends about one mile northward, and thence three-quarters of a mile north-westward. When approaching from the southward the entrance is easily picked up, as the headland on the eastern side of the entrance is high and clearly defined against the background. Both sides of the entrance are fringed by well-marked coral reefs, which narrow the channel in one place to a width of a little over half a cable. No vessels should attempt to enter at night, or in very thick weather.

Directions.—Vessels entering Hook bay should bring the entrance to bear N. 1° W., and steer into the bay, keeping in mid-channel until the narrows are passed, then head up the middle of the bay and anchor in the widest part, here about a quarter of a mile across between the 5-fathoms contours, in 10 fathoms, mud. There is room in the north-western part of the bay for two vessels, in 4 to 7 fathoms, mud.

Anchorage.—Excellent anchorage, protected from all winds from west, through north, to south-east, may be found in the small bay westward of Hook bay. To reach this anchorage vessels should stand into the middle of the bay and anchor when the western entrance point of Hook bay bears N. 89° E., in 15 or 16 fathoms, mud.

Polillo harbour, on the western side of Polillo island, is formed by a semicircular bay situated about 14 miles south-south-eastward of Panangatan point. The sheltered area of the harbour is greatly increased by a large reef, which extends over 2 miles north-north-westward from Polillo point, the western entrance point. A shoal of $1\frac{3}{4}$ fathoms lies off the extremity of this reef, and abreast of it, on the eastern side of the entrance, a shoal extends one mile north-west from Malagas point, with a rock awash on it. The head of the bay is foul, and there are a number of small detached shoals lying nearly half a mile from the eastern shore; the shoalest and southern patch, with a least depth of

General charts 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. 5 feet on it, lies about $3\frac{1}{2}$ cables from the shore, with the church bearing S. 29° E., distant one mile. This shoal can easily be distinguished by the colour of the water, but the others, which have least depths of $1\frac{1}{2}$ fathoms over them, cannot be detected until directly over them. A patch of $1\frac{1}{2}$ fathoms lies in the middle of the harbour between Polillo point and Polillo. The discoloured water observed from off-shore when entering Polillo harbour is due to the outflow from small streams. The large reef forming part of the western side of the harbour is steep-to as a rule, and marked by breakers when covered.

Anchorage.—Good anchorage for large vessels, sheltered from all winds except those from north and north-west, may be found in 13 fathoms, mud, about three-quarters of a mile north-west of the church. Small vessels usually anchor closer in, in 6 to 9 fathoms, mud, about one-third of a mile westward of the church.

Directions.—Vessels bound to Polillo should close the western shore of Polillo island 5 or 6 miles northward of Polillo, and bring the church to bear S. 37° E. and steer for it, keeping a good lookout for the shoals on either side previously described, and anchor as recommended.

Polillo (*Lat. $14^{\circ} 43' N.$, Long. $124^{\circ} 56' E.$*) is a small unimportant town on the eastern side of the bay above mentioned. It is surrounded by a dilapidated wall, overgrown by shrubbery. The church has an octagonal tower, roofed with nipa, and is visible from a long distance. The town is very poor, and few provisions are obtainable.

Eastern side of Polillo island.—A chain of islands comprising Kabaloa, Palasan, and Patanongan, besides one or two smaller ones, extends about 20 miles south-eastward from the north-eastern part of Polillo island. Patanongan is about 13 miles long and nearly 3 miles wide.

The Uala islands, the number and position of which are doubtful, lie on a bank which extends about $8\frac{1}{2}$ miles north-eastward from Patanongan.

The eastern side of Polillo island is bordered for a distance of 4 miles northward from Tataupin point, by a reef $2\frac{1}{2}$ miles wide, on the northern part of which are some rocks, 32 feet high. Pakabalo reef lies 3 miles E. by S. from these rocks, and on the eastern side of the channel leading to Burdeus bay. Numerous detached shoals lie southward and north-westward of Pakabalo reef, for which *see* the chart. Depths of $5\frac{1}{4}$ and $5\frac{1}{2}$ fathoms lie $4\frac{1}{2}$ miles off the south-eastern side of Polillo island.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$.

Burdeus bay is a bight on the east coast of Polillo island fronted by Ikolong, Palasan, and San Rafael islands. It is well protected from all winds and seas, and there is a large area of available anchorage ground. The northern entrance has not been surveyed, and nothing is known in regard to it. The surveys in this vicinity have not been completed, and in entering Burdeus bay from the southward or westward Polillo island should be given a berth of at least 5 miles until Minasawa island is sighted, but no directions are given, as local knowledge is essential.

Minasawa island (*Lat. $14^{\circ}45'N.$, Long. $122^{\circ}9'E.$*), small, and about 60 feet high, lies south-westward of the middle part of Patnanongan island. It is easily distinguished, being of a brighter green than the Patnanongan shore.

Homalig island, lying eastward of the southern end of Polillo island, is about 8 miles long east and west, about $2\frac{3}{4}$ miles wide, and 100 to 150 feet in height to the tops of the trees. The shores are fringed with reefs which extend about $1\frac{1}{2}$ miles from the north-eastern side. The west point of the island is high, abrupt, and wooded.

The Malanat islets lie on the reef extending from the eastern end of Homalig; the easternmost islet is about half a mile from the shore.

Lantao rock, 6 feet high, lies $2\frac{1}{4}$ miles northward of the east point of Homalig, at about a quarter of a mile outside the edge of the shore reef.

Tidal streams.—The tidal streams setting through the passage west of the island and along the north shore have considerable velocity, the flood setting west-south-west and the ebb eastward. The rise and fall at springs is about 7 feet.

Lantao islets, lying about $4\frac{1}{2}$ miles N. 26° E. from the east point of Homalig island, are small, and lie near each other in a north-easterly and opposite direction. The area westward of Lantao islets and northward of Homalig is reported to be foul.

LAMON BAY, comprised between Inaguikan point to the north-west and Jesus point to the south-east, is protected from northerly winds by Polillo, Homalig, and several smaller islands. The little island Balesin lies in the middle of the bay. In the south-west part of the bay are the islands Kabalete, Baliskan, and Alabat. The western shore of the bay is clean and steep-to.

From Inaguikan point a sandy shore trends westerly, for 2 miles, to the mouth of Misua creek, an estuary penetrating into the lowlands around the point. During the north-east monsoon vessels having cargo for Infanta anchor one mile to the southward of the mouth of Misua creek, in 7 fathoms, or at Port Lampon, 5 miles farther south-

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$. west. This part of the coast is bordered by a shoal about half a mile wide, with from $3\frac{1}{2}$ to 5 fathoms outside the edge.

Plan of Port Lampon on 3126.

Port Lampon (*Lat. $14^{\circ} 40' N.$, Long. $121^{\circ} 37' E.$*), in the north-west part of Lamon bay, is a small but well-sheltered port except during south-east and southerly winds. It has a depth of 11 to 13 fathoms, mud, at the entrance, decreasing to 3 fathoms about one-third of a mile within, and thence to the head of the port the depths are $1\frac{1}{4}$ to $2\frac{1}{4}$ fathoms. The eastern part of the port is very shoal, with a depth of one to 3 feet at the edge of the bank. The island of Orista lies about 2 cables within the edge of the bank.

The shores are covered with dense vegetation. From the port five lagoons run into the lowlands forming Inaguikan point, the largest of which, known as the Pulo river, is navigable for launches for $2\frac{1}{2}$ miles, to the village of Pulo, whence a path leads to Infanta, $2\frac{3}{4}$ miles distant. Directly opposite Takligan point, on the eastern side of the entrance, there is a mountain stream, affording good water, which may be entered at half tide.

This place is celebrated in the history of the Philippines by having been, during a part of the 16th century, the depôt of the Spanish galleons and the treasures of Manila.

Infanta is the nearest place in this vicinity where supplies of any kind can be obtained.

Anchorage.—Good anchorage may be found, in 5 to 7 fathoms, inside Takligan point.

Tides.—It is high water, full and change, at Port Lampon, at 6h. 15m.; springs rise 6 feet, neaps $3\frac{1}{4}$ feet (approximate).

Rock.—About $12\frac{1}{2}$ miles south of Port Lampon, a rock about 40 feet in height lies a quarter of a mile off the shore, with which it is connected by a reef dry at low water; a reef also extends $1\frac{1}{2}$ cables eastward of the rock.

Saley point lies about 27 miles southward of Inaguikan point, and is high, well wooded, and surrounded by deep water. About 6 miles northward of Saley point there is a large waterfall pouring directly into the sea, underneath which small boats may be filled at half tide.

Plan of Mauban bay on 1622.

Malazor point, about 2 miles south-south-westward of Saley point, is low, and terminates in a wooded knoll higher than the rest of the point. A coral reef extends over half a cable eastward and southward of the point.

General charts 2577, 943, 2661b, 1263.

Plan of Mauban bay on 1622. Var. 6° 30' E.

Mauban bay, south-westward of **Malazor point**, is clean, and the depths decrease gradually towards the shore over a bottom of mud. The anchorage depths are from 4 to 7 fathoms. East-south-eastward of the town the 10-fathoms contour line is about one mile distant from the shore.

Mauban (*Lat. 14° 12' N., Long. 121° 44' E.*) is a small port of little commercial importance, about the only article exported being copra. The most conspicuous object in the town is a large galvanised iron church, resembling a grain elevator, standing in the south-west part of the town alongside the ruins of an old stone church. No supplies are available. Good water can be obtained from a spring, but it is 250 yards from the beach.

Anchorage may be had in about $4\frac{1}{2}$ fathoms, at 6 cables from the town, with the church bearing N. 73° W., and **Malazor point** N. 30° E., or farther out, as desired.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—From **Mauban** the coast trends south-eastward for 8 miles to **Petisa point**, and thence 8 miles farther in the same direction to **Atimonan**. This part of the coast is fringed with a narrow bank, with deep water close-to. The shores are generally sandy beaches fringed with cocoanut trees and backed by high wooded hills. Two twin peaks, $3\frac{1}{2}$ and $4\frac{1}{2}$ miles north-westward from **Atimonan** and $1\frac{1}{4}$ miles from the shore, rise to heights of 1,279 and 1,241 feet, and form conspicuous landmarks.

Atimonan, the principal town in this vicinity and a regular port of call for coasting steamers, lies on the right bank, and at the mouth of the **Atimonan river**, about 16 miles south-eastward of **Mauban**. It contains a large church, the tower of which, resembling a white lighthouse, can be seen from a position near the north end of **Alabat island**; the rest of the town is nearly concealed by cocoanut trees. A considerable amount of copra and some hemp is shipped from here. There is a wagon road to **Lucena** on the south coast of **Luzon**. The **Atimonan river** is small, and has a depth of from 7 to 9 feet on the bar at high water.

Atimonan is a telegraph station.

Anchorage may be found off the river mouth in 10 fathoms, mud, with the church bearing S. 1° E. Small vessels may anchor closer in, but they should not go inside of 6 fathoms, as the water shoals rapidly after that, and the holding ground of hard sand is poor. During the north-east monsoon this anchorage is sometimes untenable; vessels then seek refuge at **Port Alabat** or **Sangirin bay**, on the south side of **Alabat island**.

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E.

Gumaka and Lopez are two small towns situated $11\frac{1}{2}$ and $20\frac{1}{2}$ miles eastward of Atimonan, through which port most of their business is done. Lopez lies on the river of the same name, about $1\frac{1}{2}$ miles from the mouth, and is not visible from the sea.

Coast.—From Atimonan to the entrance of the Lopez river, about 17 miles eastward, the coast for the most part is fringed by a very narrow reef, and may be approached anywhere to a distance of half a mile. Off Gumaka, there is anchorage in 3 to 10 fathoms. In Lopez bay, off the entrance of the river of that name, there is anchorage in from 3 to 10 fathoms, open to the north-west.

From the Lopez river entrance the coast trends north-north-east and then north-west to Roma point, which forms the south side of Silangan pass. This part of the coast is fronted by a wide coral reef, partly dry at low water, beyond which shoal water extends to a considerable distance. Three small islets lie on this reef close to the shore. The south-eastern extreme of Alabat island, bearing nothing northward of N. 36° E., leads westward of all dangers off Roma point.

ISLANDS. — **Balesin island** (*Lat. $14^{\circ} 26'$ N., Long. $122^{\circ} 2'$ E.*) lies about 12 miles south-south-eastward of the south point of Polillo island. It is $2\frac{3}{4}$ miles long north and south, nearly a mile wide at the northern end, and tapers to a point at the southern end. It is low, flat, and wooded, the general height to the tops of the trees being about 78 feet. Close to the north-east end are two small islets, and from these a reef extends to the northward. A bank with depths from $2\frac{1}{4}$ to $4\frac{1}{4}$ fathoms extends $2\frac{1}{4}$ miles westward of the island.

Tarlak reef, with $4\frac{1}{4}$ fathoms, lies $1\frac{3}{4}$ miles south-westward, and a 2-fathoms patch (position doubtful) has been reported at about $2\frac{1}{2}$ miles southward of the south point of Balesin island.

Kabalete island, situated about 24 miles southward from Inaguikan point, is about $3\frac{1}{2}$ miles long north and south, 3 miles wide at the northern end, and tapers to a rounded point at the southern end. It is heavily wooded, and there is a ridge 170 feet high running close to the shore between the north-west and north-east points. The island is surrounded by a reef which, on the south-east side, extends off over a mile, and detached reefs with 4 and $5\frac{1}{2}$ fathoms lie at 2 miles from the same side. The channel between Kabalete island and Saley point on the mainland is about $2\frac{1}{2}$ miles wide, with deep water; vessels using this channel should favour the Luzon shore.

General charts 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$.

Baliskan islet, lying about $4\frac{1}{2}$ miles eastward of the south point of Kabaleta and $1\frac{3}{4}$ miles westward of the north point of Alabat island, is small and steep-to, except on the south-west side, where a reef, with depths of 2 to 5 fathoms on it, extends off a quarter of a mile. It is a bare flat-topped rock, about 100 yards in extent, 20 feet high, and is much underworn at its base by the action of the sea. It cannot be seen at night until close to. The channels on either side are deep and clear.

ALABAT ISLAND is about 20 miles long north-west and south-east, $3\frac{1}{2}$ miles wide, and is easily made out. It is heavily wooded, and has a ridge of moderate height along its whole length; on it are five peaks rising to heights of from 1,057 to 1,384 feet, which look like islands when seen from a distance of 30 miles.

Gerardo point, the northern extreme of the island, is surrounded by a small reef; thence the north-east coast to Silingan point is clean and steep-to. Pasig rock, 117 feet high, lies close to the shore about the middle of the north-east side of the island.

The north-western coast from Gerardo point to Sangirin point, the north-west extreme, trends south-westward, and is fringed by a coral reef from one to $4\frac{1}{2}$ cables in width. Off Sangirin point this reef extends nearly 3 cables westward.

Sangirin bay lies eastward of Sangirin point; it is about $3\frac{3}{4}$ cables wide at the entrance, extends about half a mile northward, and affords a small well-sheltered anchorage in 8 to 16 fathoms, mud. Sangirin point and the land surrounding the bay are low; the village of Sangirin lies on the eastern shore. About half a mile southward of the mouth of the bay are two large reefs, awash at low water, which afford protection from southerly seas.

Directions.—When about one mile from Sangirin point, bring the village to bear N.E., and steer for it; round the west point of the bay, favouring the western shore, and anchor in about 8 fathoms, mud, in the middle of the bay, about $1\frac{3}{4}$ cables from the head.

Plan of Port Alabat on 3126.

Port Alabat (*Lat. $14^{\circ} 6' N.$, Long. $122^{\circ} 0' E.$*).—The Port of Alabat on the south-west side of Alabat island, and about $7\frac{1}{2}$ miles north-east from Atimonan, Luzon, has accommodation for three or four small vessels in depths of from 5 to 10 fathoms. It is formed by a bight in the coast, about a mile wide, and affords excellent shelter during gales from the northward and eastward, but can hardly be recommended as a typhoon anchorage. Long reefs of coral, the inner

General charts 2577, 943, 2661b, 1263.

Plan of Port Alabat on 3126. Var. 0° 30' E.

parts of which uncover, extend off both points of the bight; that from the north-west point extends 3 cables southward, and that from the south-east point extends over 6 cables westward, with a rock awash at low water at its extremity.

The shore of the port is low; the northern part is fringed by a narrow reef, and the remainder is fronted by an extensive sand beach, which dries out some distance. Shoal water extends from $1\frac{1}{2}$ to $2\frac{1}{2}$ cables outside high water mark.

The entrance is a quarter of a mile wide between the reefs, with depths of 14 and 15 fathoms, decreasing gradually to the edge of the shoal water.

Anchorage may be had in the northern part of the port in about 8 fathoms, mud, with the west entrance point bearing N. 82° W., distant $2\frac{3}{4}$ cables, and also in the southern part, with the church bearing N. 79° E., and the east entrance point S. 58° E., in 7 or 8 fathoms, mud. To reach the latter anchorage, steer in with the church bearing N. 79° E. or the convent N. 80° E.

The small town of Alabat (*Lat. $14^{\circ} 6' N.$, Long. $122^{\circ} 0' E.$*) is on the eastern side of the port; its resources are very scanty. Drinkable water can be obtained from a small stream on the north side of the port, which boats can enter at high tide.

The most conspicuous building in the town is the convent, a large wooden building, painted white, with a galvanised iron roof.

Tides.—It is high water, full and change, at Alabat harbour, at 7h. 33m.; springs rise 10 feet (approximate).

Chart 2577, Between San Bernardino and Mindoro straits.

Silangan pass, between the south-east end of Alabat island and Roma point, Luzon, is over half a mile wide, but the navigable width is reduced to about 3 cables by reefs fringing the shore on either hand. The depths are irregular, being from $2\frac{1}{4}$ to 15 fathoms. A rock with 3 fathoms over it lies near the middle of the pass, with Silangan church bearing N. 13° E., and is believed to be the principal danger near mid-channel, but possibly other isolated rocks may exist.

Danger.—A dangerous shoal, awash at low water, lies in the western approach to Silangan pass, with the church at Silangan bearing N. 51° E., distant about $1\frac{1}{10}$ miles.

Directions.—Vessels from the westward, should, when about 2 miles distant from the village of Silangan, bring the south-eastern extreme of Alabat island to bear N.E., and steer for it until the northern extreme of Roma point bears East, when the course should be altered to E.N.E. As soon as the pass begins to widen the course

General charts 2577, 943, 2661b, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E.$ may be shaped as desired, giving the coast northward or southward a berth of at least half a mile.

From the eastward, steer W.S.W. for the middle of the pass until the northern extreme of Roma point bears East, and the south-east extreme of Alabat island bears N.E., when steer S.W. for 2 miles.

Coast.—The peninsula between Lopez bay and Kalauag bay, terminating in Roma point (*Lat. $14^{\circ} 0' N.$, Long. $122^{\circ} 11' E.$*), is covered with heavily-wooded hills from 200 to 400 feet high. The shore from Roma point to the head of Kalauag bay is fringed by a narrow reef, and can be approached to a distance of half a mile.

Kalauag bay is 3 miles wide between the north-east side of Alabat island and the coast of Luzon, is deep, and extends 15 miles south-eastward. The head of the small bay at the south-east end, off Kalauag town, is blocked by mud-flats, parts of which dry at low water. A narrow boat channel, with a depth of about 2 feet at low water, leads to the town.

The town of Kalauag, lying at the head of the bay, is small and of little importance. Some copra and lumber are shipped from here.

Anchorage, sheltered from all except north-west winds, may be found in 5 fathoms, mud, with Kalauag church bearing S. $28^{\circ} E.$, distant $1\frac{2}{10}$ miles, and Kugasinan point, on the eastern side of the entrance of the upper bay, N. $39^{\circ} E.$

Apat bay, on the eastern side of Kalauag bay, is $1\frac{1}{2}$ miles wide at the entrance between Kugasinan and Dayap points, and extends over 2 miles north-eastward. The entrance is nearly closed by a reef extending south-eastward from Dayap point. Apat island, lying in the middle of the bay, is small and about $1\frac{1}{2}$ cables in diameter; the tops of the trees are about 75 feet high, and the island is clear on all sides except the western, from which a reef extends $1\frac{1}{2}$ cables westward.

Anchorage.—Good anchorage, in about $3\frac{1}{2}$ fathoms, may be found by steering for Apat island on a N. $60^{\circ} E.$ bearing and anchoring when Kugasinan point bears S. $1^{\circ} E.$ Perfectly protected anchorage for a small vessel may be had about 140 yards from the south side of Apat island in 2 to 3 fathoms. To approach this anchorage, continue on the N. $60^{\circ} E.$ course, and round Lungib point at a distance of one cable and anchor as directed.

Coast.—From Dayap point, the northern entrance point of Apat bay, the coast trends north-westward for 11 miles to Pangao point, and thence north-eastward for 7 miles to Dagdap point. This stretch of coast, except in the immediate vicinity of Dagdap point, is fringed with a low belt of mangroves; the shore is very irregular and

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E. indented by many small bights and the two larger bays of Dayap and San Angel. From Dayap point to Pangao point the coast is fronted by reefs, extending in some places to a distance of more than one mile, and vessels bound to Apat bay and Kalauag should give it a good berth. At Dagdap point (*Lat. 14° 15' N., Long. 122° 15' E.*) the shore line changes its character; here the fringe of mangrove is narrower and often disappears entirely, showing a sandy beach; large rocks are also found outside the mangroves.

Dayap bay, lying immediately northward of the point of that name, is small, with depths of from 2 to 7 fathoms, but is almost blocked by reefs, and of no value to the navigator.

Pulupari island, lying about $1\frac{1}{4}$ miles north-westward of Pangao point, with which it is connected by a reef, is about half a mile long north and south and a quarter of a mile wide. It is low, fringed with mangroves, and heavily wooded, the tops of the trees being 80 feet high.

Danger.—A reef, with 3 fathoms on it, lies $1\frac{1}{2}$ miles N. 65° W. from Pulupari island; between it and the island the depth is one fathom. As the rocks are covered with dark green weed they are difficult to distinguish. Vessels rounding this island should give it a wide berth.

Shoal water extends for a distance of $2\frac{1}{2}$ miles to the north-westward of a line joining the north end of Pulupari island and Dagdap point.

A shoal, covered by a least known depth of $5\frac{1}{4}$ fathoms, lies 8 miles northward from Pangao point, and another with a least known depth of $6\frac{1}{4}$ fathoms, about 5 miles northward of Dagdap point.

San Angel bay, eastward of Pangao point, is about 4 cables wide at the entrance, and extends $1\frac{1}{2}$ miles southward. This bay and its approaches are foul, as is also the coast between it and Dagdap point, reefs extending $2\frac{1}{2}$ miles off. A shoal of $1\frac{1}{2}$ fathoms extends $1\frac{1}{2}$ miles north-north-eastward from the eastern part of Dagdap point with $4\frac{1}{2}$ fathoms outside its edge.

Basiad bay, eastward of Dagdap point, is 5 miles wide and 8 miles deep; it is very foul.

Jaulo island is a small, low, flat island, surrounded by reefs, lying three-quarters of a mile from the shore, about 4 miles westward of Jesus point. Irregular bottom, with depths of 3 to 10 fathoms, extends a mile seaward of a line joining Jaulo island and Jesus point.

At $6\frac{3}{4}$ miles N.W. by W. from Jaulo island is a patch of 7 fathoms and possibly less water.

Kapalonga, a small and unimportant town, lies about $1\frac{1}{4}$ miles westward of Jesus point. In the bay off the town, which is about

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. $1\frac{1}{2}$ miles wide, the depths are $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms at $1\frac{1}{2}$ miles from its head.

Jesus point (*Lat. $14^{\circ} 21' N.$, Long. $122^{\circ} 31' E.$*) is a round-topped wooded hill over 100 feet high, connected with the mainland by a low neck of mangrove swamp, giving the point the appearance of an island when first seen from east or west. It is fringed by a reef which projects about one mile north-westward, on which the sea breaks heavily at times.

Bank.—A bank covered by a least depth of $5\frac{1}{2}$ fathoms, lies $2\frac{1}{2}$ miles N.E. from Jesus point.

Coast.—Between Jesus point and Port Mambulao, nearly 9 miles eastward, the coast is very irregular, being indented by several bays, and faced by a number of islands, reefs, and shoals. This stretch of coast is bluff, high, and heavily wooded.

Mariners not intending to enter any of the bays in this neighbourhood are advised not to come inside a line drawn from $2\frac{1}{2}$ miles northward of Jesus point to a position 2 miles north of Tabusao island (*see below*).

High point, situated about $5\frac{1}{2}$ miles east-south-eastward from Jesus point, forms the western entrance to Dahikan bay. It is over 100 feet high, well wooded, and prominent. The northern and southern sides are bordered by a narrow reef, but the eastern extremity is clean and may be rounded at a distance of one cable.

Dahikan islands, four in number, lie off the entrance to Dahikan bay. Entrance island lies close to the shore, about $1\frac{1}{2}$ miles westward from High point. It is about 150 feet high, well wooded, and is surrounded by reefs; the channel between it and the shore is only available for boats. Kalalanag island lies nearly 2 miles N. by W. from High point, and is small, 25 feet high, well wooded, and surrounded by a white sand beach, except on the northern end, which is composed of black rock. Palita island, lying about $1\frac{1}{2}$ miles north-eastward from High point, is low, wooded, and surrounded by a white sand beach.

Tabusao island, the northern of the Dahikan group, lies nearly 2 miles N. 75° W. from Pinandungan point. It is low, wooded, and surrounded by a white sand beach. Depths of $3\frac{1}{2}$ fathoms are found about $1\frac{1}{4}$ miles northward and $2\frac{1}{2}$ fathoms at 2 miles north-westward from Tabusao, and vessels using the channel between Tanao islets and the main are advised to keep midway between Palumbato, the western Tanao islet, and Tabusao.

Dahikan bay is nearly one mile wide at the entrance between High point and a long, low point extending northward from the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E. main, and extends $1\frac{1}{2}$ miles southward. The head of the bay is shoal and blocked by reefs, part of which dry at low water. There is good shelter for a small vessel in typhoon weather, in a pocket of the reef southward of High point; the anchorage area is very small, but the holding ground is good, and no sea can get in.

Directions.—To enter Dahikan bay, pass midway between Entrance and Kalalanag islands, and steer to pass about 2 cables eastward of High point. When High point bears West, round up for the head of the bight, and anchor in about 4 fathoms mud, with High point and Kalalanag island in line, and Samur island, showing midway between the south end of Palita island and the main; small craft may anchor farther up the bight on the latter mark, but this should not be done unless the reefs are visible, and it will be necessary to moor head and stern.

Coast.—Between the eastern point of Dahikan bay and the point forming the western side of Port Mambulao are two large inlets, blocked with mud and rocks, and of no value to navigation.

Kalambayanga island lies off the point on the western side of the entrance to Port Mambulao, with which it is connected by a reef dry at low water. The island is 230 feet high and wooded.

Port Mambulao (*Lat. $14^{\circ} 19' N.$, Long. $122^{\circ} 40' E.$*), about $1\frac{1}{4}$ miles wide at the entrance between Kalambayanga island and the land southward of Pinandungan point, is clean, safe, sheltered from all winds and easy of access. The depth of water diminishes gradually from 9 fathoms at the entrance to less than one fathom in front of the town at the head of the port. The town of Mambulao, at the head of the port is of slight importance; a good deal of hemp is exported to Mercedes by sailing vessel.

Anchorage.—There is a large area of good anchorage ground in the port, in any depth desired, with a bottom of soft sand. A considerable swell rolls in with north-westerly and northerly winds, and it cannot be recommended as a typhoon anchorage. No directions are requisite.

Pinandungan point, the eastern entrance point of Port Mambulao, is a bluff wooded point, bordered by a steep-to coral reef, about one cable in width. A patch of $2\frac{3}{4}$ fathoms lies about three-quarters of a mile north-east of the point. About one mile eastward of the point is a low point covered with mangroves and surrounded by reefs, extending nearly a quarter of a mile.

Tanao islets are a group of three islets and a number of large rocks lying about 4 miles northward of Pinandungan point.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E.

Palumbato, the western islet, is 49 feet high, bare and conspicuously flat on top.

Tailon, the largest of the group, lies over $1\frac{1}{2}$ miles S. 74° E. from Palumbato; it is low, surrounded by a white sand beach and covered with bushes. A ridge of shoals, on which the sea breaks in a northerly swell, lies between Palumbato and Tailon.

Tanao islet, situated about half a mile south-eastward of Tailon, is small, wooded, and the most prominent of the group, rising to a peak 57 feet high. Two conspicuous black rocks, 32 feet high, lie northward of Tanao; these rocks, with Tanao and Tailon islets, all stand on the same reef, which dries at low water. The south side of Tanao islet has very little reef off it, with deep water close-to.

A bank extends $5\frac{1}{2}$ miles eastward and $3\frac{1}{2}$ miles south-eastward from Tailon islet, within the 10-fathoms limit, with patches of $3\frac{3}{4}$ to $5\frac{1}{2}$ fathoms on it, besides the shoal mentioned below.

Shoal.—A small shoal patch, with a least depth of 2 feet over it, lies $1\frac{2}{10}$ miles S. 59° E. from Tanao islet.

KALAGUA ISLANDS are a group of six principal islands and a number of smaller islets and rocks, situated in the entrance to Lamon bay. The principal islands from west to east are Makulabo, Samur, Tinaga, Guintinua, Ingalan, and Huag. Most of the group are bold, but of no great height except Makulabo, which reaches over 800 feet. The two largest of the group, Guintinua and Tinaga, are joined to each other and to several of the smaller islands, the eastern of which is Huag, by coral reefs which dry at low water. There are deep channels between this group of connected islands and all the other islands. There is no good harbour in the entire group. Only the islands which immediately concern the navigator will be described.

Makulabo island (*Lat. $14^{\circ} 24' N.$, Long. $122^{\circ} 49' E.$*), the south-western and most important island to the navigator, lies with its southern extremity $4\frac{3}{4}$ miles N. 19° E. from Pulundaga point, the nearest point of Luzon. It is over 2 miles long in a north-north-west and opposite direction, two-thirds of a mile wide, 814 feet high, and is clean and steep-to except for a narrow fringe of coral on its western side, which dries at low water. Between Makulabo island and the bank extending eastward from Tailon islet, is a bank with depths of $3\frac{3}{4}$ and $4\frac{3}{4}$ fathoms on it.

Samur island, lying about $3\frac{1}{2}$ miles N. 24° E. from the north end of Makulabo, is small, round-topped, 306 feet high, and forms a good landmark. Two islets lie three-quarters of a mile south-east of Samur, and between them and Tinaga island the depth is from 6 to 8 fathoms.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$.

Thurston rock is a small rock, about 10 feet high, lying 7 miles N. 14° W. from the north end of Makulabo; a reef of rocks, some of which are awash, lies from three-quarters to $1\frac{1}{2}$ miles eastward of Thurston rock. Breakers have been reported as being seen about 4 miles north-westward of Thurston rock.

Lima rock, with 4 feet of water on it, lies 4 miles N. 7° W. from Thurston rock.

The passage between Tanao islets and Makulabo on the south and Thurston rock and Samur on the north has patches of from 6 to 9 fathoms and possibly less water in it.

The survey in this vicinity is not complete, and mariners are advised for the present to avoid the locality northward of the Tanao islets and Makulabo.

Ingalan island, lying $7\frac{1}{2}$ miles S. 85° E. from the south end of Makulabo, is small, covered with grass, and 259 feet high. It is clean and steep-to on all sides.

Amalia, 92 feet, and Paquita, 120 feet high, are two very small islets lying $4\frac{1}{2}$ and $5\frac{1}{4}$ miles respectively eastward of the east end of Ingalan island. These islets are clean and steep-to.

Roses reef lies about one mile westward of Amalia islet, and has two dangerous rocks with depths of $5\frac{1}{2}$ fathoms between them. These rocks, with about 2 and 5 feet on them, lie respectively 8 cables S. 68° W. and one mile S. 86° W., from the centre of Amalia islet. To the north, west, and south of Roses reef the depths increase rapidly to 20 fathoms or more, but eastward a coral bottom of unequal depths extends toward Amalia islet.

Matandumaten rock is a bare perpendicular rock about 300 feet in diameter and 145 feet high, lying 5 miles S. 71° E. from Paquita islet. Close to it on the north-east, east, and south-west sides there are rocks 40 to 50 feet high, and south-westward of it there are rocks awash. Matandumaten is a conspicuous mark, being visible from a distance of from 15 to 18 miles, and may be passed at a distance of a mile.

Anchorage (Lat. $14^{\circ} 24' N.$, Long. $122^{\circ} 57' E.$).—In strong north-east winds good protected anchorage may be found about 4 cables south-westward from the village of Banakbok on the south side of Guintinua island. From this anchorage the west end of Ingalan island should bear S. 1° E., and the south tangent of Guintinua island S. 88° E. Small vessels may anchor closer in, but they should proceed cautiously as the shore reef is steep-to.

Tanao pass, situated between the Tanao islets and Makulabo on the north and the coast of Luzon, is 4 miles wide at the narrowest

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E. part between Tanao islet and Pinandungan point, and contains much foul ground. Medio reef is the name given to a large shoal covered by a least depth of 3 fathoms, lying with its shoalest part nearly 3 miles S. 63° W. from the south end of Makulabo island. The reef is about 2 miles long east and west, and half a mile broad within the 10-fathoms limit, and the widest and best channel is southward of it. A patch of $5\frac{1}{2}$ fathoms lies eastward of Medio reef and $1\frac{1}{2}$ miles S. 55° E. from the south end of Makulabo island.

Directions.—To pass southward of Medio reef from the westward, from a position midway between Tailon islet of the Tanao group and Pinandungan point, steer S. 73° E. until the low mangrove-covered point eastward of Pinandungan point bears S. 89° W., when the course should be altered to N. 89° E., until Bakakai point is abeam, when all dangers will be passed.

To pass southward of Medio reef from the eastward, bring the mangrove-covered point eastward of Pinandungan point to bear S. 89° W., and steer for it until Tailon islet bears N. 55° W., when the course should be altered to N. 73° W., heading to pass midway between Pinandungan point and Tailon island.

Heavy-draught vessels will find the best water by passing $1\frac{1}{2}$ miles northward of Tabusao island, Pinandungan, Gumaus, and Pulandaga points, and 2 miles northward of Tanoban point.

Danger (*Lat. 14° 45' N., Long. 123° 25' E.*).—A great bank is shown on the charts as lying 28 miles north-eastward of the Kalaguas, stretching 20 miles west-north-west and east-south-east, with 3 to 5 fathoms of water over it. No soundings are given in the neighbourhood of this bank, nor between it and the coast; but it is believed that the channel between the bank and the Kalaguas is deep.

COAST.—From a point lying about $2\frac{1}{2}$ miles eastward of Pinandungan point, the coast trends in a general south-east direction for 22 miles to the entrance of the Daet river. From Pinandungan point to Bakakai point, about 12 miles south-eastward, the land is high and heavily wooded, with several prominent hills; this part of the coast is fringed by a narrow reef, steep-to. Between Bakakai point and the Daet river the shores are low and sandy.

Gumaus bay, lying between an unnamed point and Gumaus point, $2\frac{1}{2}$ and $4\frac{1}{2}$ miles respectively from Pinandungan point, is about 2 miles wide at the entrance, and extends $1\frac{1}{2}$ miles southward. The bay has anchorage depths of from 4 to 10 fathoms, and is clear, with the exception of a small patch of 2 fathoms lying over half a mile north-westward of Gumaus point. There are no villages on the shore of the bay.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E.

Pulandaga point, situated $2\frac{1}{2}$ miles south-eastward from Gumaus point, is over 50 feet high, well wooded, and bordered by a narrow reef. Pulandaga bay is a small cove about half a mile in extent, lying immediately westward of Pulandaga point; its shores are fringed with coral.

Between Pulandaga and Tanoban points the coast recedes southward about $1\frac{1}{2}$ miles, forming a large bay, which is divided into Parakale and Malaguit bays by Longos point. Parakale and Malaguit rivers discharge into the bays of the same name.

Parakale river is of no value to navigation; hydraulic dredging for gold is being carried on in the river. The town of Parakale is situated on the river.

The village of Malaguit is situated on the river of that name, the mouth of which is wide but choked by rocks.

Anchorage.—Good anchorage, in from 2 to 6 fathoms, may be found in either of these two bays during the south-west monsoon, but they, as well as Gumaus and Pulandaga bays, are frequently untenable during the north-east monsoon.

Parakale reef is small, with a least depth of 4 fathoms over it, situated N. 73° E., 2 miles from Pulandaga point. A patch of $4\frac{1}{2}$ fathoms lies about one mile south-east of Parakale reef and the same distance off shore.

Bakakai point rises to a wooded hill 370 feet high, marked by a remarkable bare spot about half a mile inland. It is surrounded by a narrow steep-to reef.

Shoal.—A patch of $2\frac{1}{2}$ fathoms least water lies about one mile eastward of Bakakai point.

Indan point (*Lat. $14^\circ 13'$ N., Long. $122^\circ 56'$ E.*) is about $4\frac{3}{4}$ miles south-eastward of Bakakai point; between these points the coast recedes southward, forming a large bay, with sandy shores wooded to the water's edge. The Indan river discharges on the western side of the point; it is very shoal and of no value to navigation. Rocks and shoal water extend $1\frac{3}{4}$ miles northward and one mile eastward from Indan point, which should be given a good berth.

Kinamanuka island, $1\frac{1}{2}$ miles south-eastward of Indan point and three-quarters of a mile off shore, is small, 12 feet high, and heavily wooded, which makes it show well against the low country between the beach and Mount Bakakai. It is fringed on the eastern side by coral, beyond which shoal water extends nearly half a mile. Vessels should give it a berth of at least one mile in passing. The island is separated from the coast by a channel 2 fathoms deep, which is of no value to shipping.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E.

Between Indan point and the entrance to the Daet river, $8\frac{1}{2}$ miles south-eastward, shoal water extends for a distance of $1\frac{3}{4}$ miles in some places. A leading mark for a safe course along this part of the coast is the south-west extreme of Kanimo island, in line with the north-east extreme of Karingo island, S. 39 E. Vessels leaving Daet river for the westward are advised to make use of this mark as long as it is visible.

Banks.—A small bank on which the least depth is $6\frac{1}{4}$ fathoms, rock, lies N.N.W. $2\frac{3}{4}$ miles from the north-west point of Kanimo island. Another bank, larger in extent, with a least depth of 8 fathoms, lies $4\frac{1}{2}$ miles N. 37° W. from the same point.

Daet river enters the sea $8\frac{1}{2}$ miles south-eastward of Indan point. The current in the river is strong, sometimes reaching a velocity of 6 or 7 knots an hour. The depth up to Mercedes is $1\frac{1}{2}$ fathoms at low water.

Anchorage.—Buoys.—A black can buoy marks the anchorage off the mouth of Daet river, with the white building at Mercedes bearing S. $\frac{1}{2}$ W., distant nearly 7 cables.

Vessels should anchor north-westward of this buoy in from 7 to 8 fathoms, mud bottom.

Three black spar buoys are moored along the eastern side and near the fairway of Daet river.

Pilots are always on the lookout, and will go out if it is possible to cross the bar.

Directions.—To approach the entrance of Daet river, bring the top of a high conical mountain southward of Mercedes to bear S. 21° W., and steer for it. Vessels awaiting a pilot or not desirous of entering the river should anchor as directed above. Vessels entering the river should leave all the channel buoys close aboard on the port hand until the third buoy is nearly abeam, whence the sand spit to starboard should be rounded sharply and the vessel moored according to wind and tide.

Daet, the most important town in this vicinity, lies about 4 miles inland on the river of the same name. Most of its business is done through the port of Mercedes at the mouth of the river, with which it is connected by a light street railway.

Mercedes (Lat. $14^{\circ} 7' N.$, Long. $123^{\circ} 0' E.$), the port of Daet, lies at the mouth of the Daet river. It is composed principally of warehouses for hemp, rice, &c., and a small collection of native houses. Mercedes is not a safe port for vessels of more than 12 feet draught or over 180 feet long. The harbour is formed by the banks of the river, and a large reef across the entrance affords protection from the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E.
 sea. The available navigable area is very small, and vessels are obliged to moor to the wharves. During the north-east monsoon vessels should lie with their heads seaward. Good off-anchors should be used on account of the strength of the current.

Communication.—Regular steam communication is maintained with Manila and the ports of eastern Luzon, and a considerable trade is carried on by schooners with the ports in the vicinity.

Kanimo island, situated 2 miles eastward of Daet river entrance, is 2 miles long north and south, one mile wide at the northern end, and tapers to a point at the southern end. It is bordered by a narrow, steep-to reef. It rises in the northern part to a height of 606 feet, and the northern and eastern slopes are covered with cogon grass to the summit, while the rest of the island is heavily wooded. Good anchorage, in from 5 to 7 fathoms, protected from all winds except those from the northward, may be found westward of Kanimo island.

LIGHT (*Lat. 14° 8' N., Long. 123° 3' E.*).—A white occulting light every ten seconds, the duration of the eclipse being three seconds, visible 15 miles in clear weather, is exhibited, at an elevation of 130 feet above high water, from a white pole, 12 feet high, on the north-west extremity of Kanimo island. For arc of visibility, see Light list.

Kanton (Canton) island, about 2 miles south-eastward of Kanimo, is small, and 355 feet high. There is a conspicuous tree on the summit of the island, and the south-eastern extremity is a prominent, thinly-wooded bluff, which forms a good landmark for vessels approaching San Miguel bay. Several smaller islets and rocks lie between Kanton and Kanimo islands. Kanton and the smaller islets just mentioned are connected and surrounded by reefs, parts of which dry at low water, leaving a narrow 2-fathoms channel between a small black rocky islet lying on the western edge of the reef, and Kanimo island.

Kinapagyan island, lying about $1\frac{1}{4}$ miles west-south-west of Kanton island and one mile east of Pambuan point, Luzon, forms the eastern entrance point of the south end of Kanimo pass. It is low, heavily wooded, and about two-thirds of a mile in extent. Sand point, the western extreme, is a steep-to, projecting sandy point. A small, low islet named Malasugue lies about midway between Kinapagyan and Karingo islands.

Kanimo pass, the western channel into San Miguel bay, lies between Luzon on the west and Kanimo and Kinapagyan islands on the east, and has a depth of 18 feet. It is the usual route taken by

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E. small coasting steamers between Daet and Nueva Caceres. Strangers are advised to take a pilot, who may be obtained at either of the above-mentioned places. For vessels bound south there are no difficulties to meet until nearing Kinapagyan island; here the channel is narrowed by reefs from the mainland and a large reef extending from the north side of the island, on which are some spots of 8 feet water.

Buoy.—The greatest danger in Kanimo pass is a large rocky reef extending eastward from Pambuan point, which dries at low water, and does not give any signs of its existence at other times. Its eastern edge lies about $3\frac{1}{2}$ cables N. 73° W. from Sand point, and is marked by a red conical buoy in 18 feet of water. Vessels must not pass westward of the buoy.

Directions.—Vessels from the northward should steer for Sand point on a S. 21° E. bearing from a position off Kanimo light; when approaching Sand point, haul to the southward to give the point a berth of about $1\frac{1}{4}$ cables. Kolasi point, open a little westward of Sand point, leads westward of the 8-feet spots on the eastern side of the channel.

Karingo island (Lat. $14^\circ 2' N.$, Long. $123^\circ 6' E.$), situated $1\frac{1}{2}$ miles southward of Kanton island, forms the western entrance point of the main channel into San Miguel bay. It is generally low and well wooded, but on the south side there is a bluff about 40 feet high. The north-eastern and eastern sides are fronted by a coral reef which dries out in places to a distance of about two-thirds of a mile.

The area bounded by Karingo, Kinapagyan and Kanton islands, and the islets adjacent to the latter, is foul, and should not be entered without local knowledge.

SAN MIGUEL BAY.—This large bay extends 18 miles southward from the entrance between Karingo and Siruma islands, and varies in width from $5\frac{1}{2}$ miles at that entrance to 16 miles at about 4 miles from its head. The navigable width at the entrance is contracted by Bikol rock awash at half-tide rather more than a mile westward of the west end of Siruma island. The bay is surrounded by high mountains, and is capable of sheltering vessels of any size. Depths of 14 to 17 fathoms will be found in the entrance, and from 6 to 8 fathoms in the middle of the bay, decreasing gradually towards the shore. The southern part of the bay is very shoal, the 3-fathoms line lying about $2\frac{1}{2}$ miles from the shore at the head.

Western side.—From Kolasi point, about $3\frac{1}{2}$ miles southward from Karingo island, the western shore of the bay trends about $5\frac{1}{2}$ miles southward to Magsatangi point, and is heavily wooded and mountainous. The shore is steep-to, and, except for reefs off Kolasi

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E. point, may be approached to a distance of half a mile. The village of Kolasi, on a bluff about 2 miles northward of Magsatangi point, is small and not readily seen from the sea.

Kolasi peak, lying close to the shore, about 5 miles southward from Kolasi point, is a sharp, conical hill, 1,275 feet high. This hill is only about one-half the height of the other peaks of the neighbouring hills, but it is conspicuously isolated from the rest of the high land, and is readily identified from all directions except from the south-eastward.

Magsatangi point, the most eastern point on the western side of San Miguel bay, is formed by the slope of Kolasi peak. From the point the coast trends south-south-westward for 7 miles to the entrance of the Manga river. The shore along this part of the bay is generally rocky, though broken by several sand patches and timbered to the water's edge. Projecting from the south side of Magsatangi point is a hook of land nearly one mile in length, enclosing a shoal basin, which dries at extreme low water. The conspicuous part of this hook is Takubtakuban hill, round-topped and 340 feet high; the neck connecting this with the mainland and with the curved hook projecting westward from its south side consists of low, narrow sand spits covered with mangroves.

Anchorage.—In strong north-west winds good anchorage in 3 fathoms, mud, may be found half a mile southward of the western extreme of this hook. Larger vessels may anchor farther out in 4 fathoms, with Takubtakuban hill and Kolasi peak in line.

Southern side.—From the Manga river entrance, the coast trends east-south-eastward for 5 miles to the entrance of the Bikol river, and consists of a gently curving sand beach. Just south of the Manga river entrance, the village of Barceloneta lies at the foot of a fairly conspicuous bluff, showing red soil in places and grass-covered elsewhere.

Bikol river (*Lat. 13° 44' N., Long. 123° 7' E.*), which discharges itself through a low flat shore, is navigable for small steamers of very light draught and not over 140 feet in length, throughout a length of 24 miles, as far as the important town of Nueva Caceres, with a population of 17,943 in 1903, and the capital of the province of Ambos Camarines. Kabusao, on the left bank at the mouth of the Bikol river, is only a fishing village.

Bar.—The least depth in the best channel over the bar off the mouth of the Bikol river is $8\frac{3}{4}$ feet at mean high water. The bottom at this place is soft mud, and a vessel just touching will usually pro-

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$.
ceed without stopping. On the bar proper the depth is 9 feet, sand,
at mean high water.

Leading beacons.—Two pairs of leading beacons have been erected to mark the best water over the bar off the mouth of the Bikol river. Each pair of beacons consists of two large white triangular-shaped daymarks with a black vertical stripe through the centre. The first pair are situated about $1\frac{2}{10}$ miles eastward of the river entrance, and when in line bear S. 26° W. The second pair are situated three-quarters of a mile northward from the village of Kabusao, and when in line bear S. 81° W.

Anchorage.—Buoys.—A black can buoy is moored in $3\frac{1}{4}$ fathoms northward of the shoals extending off Bikol river, with the mouth of the river bearing S.W. by S., distant $3\frac{1}{2}$ miles.

The anchorage, in from 3 to 4 fathoms, is northward of this buoy.

One red conical buoy, and two black spar buoys, mark the channel across the bar. The red buoy marks the first turning point on the bar, and the two black spar buoys mark the shoal water at the eastern entrance point of the river.

Pilots are always in attendance at the village of Kabusao.

Directions.—To enter the river, when about 2 miles off-shore, bring the first pair of beacons in line S. 26° W., and steer for them; when up with the red buoy round it sharply, and bring the second pair of beacons in line S. 81° W., and steer for them until the first black buoy is abeam, which should be rounded with starboard helm.

Coast.—From the entrance to the Bikol river the coast curves gradually eastward for about 7 miles to Tanglar point. The beach is low, flat, and muddy, and landing is impossible except at high water or at the mouth of the Kalabanga river, 5 miles eastward of the Bikol river. At $1\frac{1}{2}$ miles from the shore the depth is 2 fathoms. Tanglar island, off the point of the same name, is small, covered with trees, and has rocks along its north shore.

From Tanglar point the coast trends north-eastward for 6 miles to the entrance to the Kalwan river; Kagsao and Bogui points about midway are principal breaks in a muddy or sandy beach. Back from the shore the land rises in irregular hills covered partly with timber and partly with grass. These are the foothills of Mount Isarog.

Mount Isarog, an extinct volcano, lies about 10 miles south-eastward of Tanglar point. It rises to two peaks 6,462 and 6,255 feet high respectively. Situated as it is, nearly midway between San Miguel bay and Laganoy gulf, it forms a very conspicuous landmark.

Kauit island (*Lat. $13^{\circ} 46' N.$, Long. $123^{\circ} 16' E.$*), lying abreast of Kagsao point and about one mile from the shore, is half a mile

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. long east and west, and narrow. On the northern side is a light-coloured bluff.

Kabgan island, less than a quarter of a mile in extent, lies about $2\frac{1}{2}$ cables southward of Kautit island. It is a round-topped cone with an immense banyan tree on the summit. On the south-west side of the island is a small wharf with 9 feet of water at the end. There is a small warehouse on Kabgan, and a larger one on the mainland opposite, at the village of Paris.

Rocks.—About 4 cables westward of Kautit island is a shoal of sand, with a rock on it 7 feet high.

Anchorage.—The space between the mainland and Kautit and Kabgan islands has a depth of 7 feet at low water, with a bottom of soft mud, and affords a perfectly safe anchorage for small vessels.

Eastern side. — **Siruma island** (*Lat. $14^{\circ} 2' N$, Long. $123^{\circ} 13' E$*), the eastern entrance point of San Miguel bay, is a small wooded island rising to a height of about 50 feet. It is one mile long east and west, about half a mile wide, and surrounded by a reef which extends nearly three-quarters of a mile westward. The eastern end is connected by reefs with Siruma point, a long narrow point projecting westward from the mainland. A small bushy islet lies on the reef about a cable northward of the north end of Siruma island.

Dangers.—Bikol rock, awash at half-tide, lies about $1\frac{1}{10}$ miles west of the western end of Siruma island. The channel between this rock and the reef extending westward from the island is about a quarter of a mile wide, with a depth of 6 fathoms.

A shoal of $2\frac{1}{2}$ fathoms lies $1\frac{1}{4}$ miles W. by N. from the north point of Siruma island, and another of 3 fathoms lies $1\frac{1}{2}$ miles N.W. from the same point.

A rocky patch, with a least depth of $1\frac{1}{4}$ fathoms, lies about $1\frac{1}{4}$ miles southward from the west end of Siruma island, with several similar ones between.

Siruma bay, between Siruma and Kelun points, is about $1\frac{1}{4}$ miles wide at the entrance, and extends 2 miles eastward; there is a depth of $2\frac{1}{2}$ fathoms at the entrance, decreasing gradually towards its head, but there are numerous islets and coral shoals in the bay. The town of Siruma lies on the south shore about one mile within the entrance.

About one mile westward of Kelun point on the south side of the entrance to Siruma bay is a low rocky islet with a few bushes on it, and a quarter of a mile north-westward of the islet is a long detached

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. reef awash at low water. The whole vicinity of this islet and Kelun point is foul, and should be avoided.

From Kelun point the coast trends southward for 2 miles to San Miguel island.

San Miguel island is three-quarters of a mile long north-west and south-east, and narrow; it is low and well wooded, with rocky shores. At the south-east end it is connected with the main by a sandbar, dry at low water. Off the north-west end are detached rocks to a distance of $1\frac{1}{2}$ cables; this point should not be approached nearer than one-third of a mile.

Anchorage.—Large vessels can anchor in 5 fathoms, mud, three-quarters of a mile southward of the south-east point of San Miguel island; the approach to the anchorage is clean and the water shoals gradually; smaller vessels can anchor nearer the Luzon shore in 3 fathoms, sand, about half a mile south-eastward of the same point, fairly sheltered from winds between north-west, through north, and south-east.

There is a small anchorage in 3 fathoms, sand, mud, and rocks, eastward of the north end of the island, half-way between the point and the shore of the mainland. This anchorage should be approached with caution, as there are rocks, dry at low water, some distance off the shore of the mainland.

From San Miguel island to the Look river, $4\frac{1}{2}$ miles south-eastward, the coast is irregular, with several shoal bays and rocky points. The bottom off this shore is hard sand (with rocks close in-shore) to a depth of between 3 and 4 fathoms, outside of which the bottom becomes soft mud.

Balokbalok point (*Lat. $13^{\circ} 54' N.$, Long. $123^{\circ} 17' E.$*), the southern entrance point of the Look river, is low and sandy, and has a spit, covered at high water, extending northward to a distance of half a mile.

Look river, about $1\frac{1}{2}$ miles wide at the entrance, is the outlet of a tidal lagoon 2 miles long in a north-north-east and opposite direction and three-quarters of a mile in greatest width. The shores of this lagoon are low and mostly covered with mangroves; there is a small islet in the centre. The Look river leaves the lagoon as a clear channel one-third of a mile wide and 3 fathoms deep, through which the tidal streams run with considerable velocity. The river gradually widens and shoals at a distance of one mile from the lagoon, and the channel becomes dangerously contracted by rocks on both sides, carrying a depth of $1\frac{1}{2}$ fathoms at low water, but impossible for a stranger or in thick weather; at the entrance to the river from San

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E.
Miguel bay the depth is $1\frac{1}{4}$ fathoms. For vessels that can enter there is excellent shelter in the upper part of the river.

From Balokbalok point the coast trends south-south-east for 7 miles to the entrance to the Kalwan river. For the first 3 miles the shore is rocky, and the bottom off it changes from mud to sand at between 3 and 4 fathoms. For the last 4 miles the shore is low, and mud bottom extends in to the muddy or sandy beach.

Kagliliog point, about three-quarters of a mile southward of Balokbalok point, is rocky, and has a detached rock about half a cable off it. The bottom is rocky for some distance off, and this rock should not be approached closer than half a mile.

Tinambak is a small town situated about $1\frac{1}{4}$ miles northward from the entrance to the Kalwan river. The church has a white cross, which is a good mark in a suitable light.

Directions for San Miguel bay.—Vessels entering San Miguel bay should give the dangers off Siruma island, on the eastern side of the entrance a good berth, and if bound to Nueva Caceres should bring the eastern end of Kanton island (south-eastward of Kanimo island) to bear N. 9° W., and steer S. 9° E. When Kauit island bears East the vessel will be near the buoy marking the anchorage (*see* page 560), and should anchor in 3 or 4 fathoms to wait for the pilot or for water on the bar as may be necessary. *See* Directions for Bikol river on page 560.

If bound for the wharf on Kabgan island (Kauit landing), bring the east end of Kanton island to bear N. 26° W., and steer S. 26° E. When Kauit and Kabgan islands are sighted haul to the southward to be in a position one mile westward of Kabgan island when it bears N. 89° E. From this position steer for the wharf on Kabgan island.

Sapenitan bay (*Lat. 14° 3' N., Long. 123° 15' E.*), between Siruma and Sapenitan points, is about 3 miles wide at the entrance, and extends over 2 miles south-eastward, with depths of from 5 to 13 fathoms. Good anchorage, sheltered from all winds except those from north and north-west, may be found in from 5 to 6 fathoms, mud, about half a mile from the shore between the mouths of two small rivers which discharge near the head of the bay.

Sapenitan point is low and wooded at the extremity, but rises to a height of 352 feet about 2 miles inland. It is surrounded by a wide reef, partly dry at low water, which extends one mile north-westward and northward.

Coast.—From Sapenitan point to Kinabukasan point, about 5 miles east-north-eastward, the coast forms Butauanan bay, the western arm of which extends 2 miles south-eastward. The shores

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ} 50' E.$ of this bay are fringed with reefs, leaving a deep pocket over one mile long and half a mile wide between them, with anchorage depths of from 6 to 15 fathoms. The eastern bay is entirely filled with reefs on which lie a number of small islets; the north-western islet, 50 feet high, marks the south-east side of the channel between Kinabukasan point and Butauanan island.

Butauanan island (*Lat. $14^{\circ} 7' N.$, Long. $123^{\circ} 18' E.$*), $3\frac{1}{2}$ miles in length north-west and south-east and nearly one mile wide, lies north-westward of Kinabukasan point, from which it is separated by a narrow channel. It is well wooded, and rises in the northern part to a height of 763 feet. The northern part of the island is clean, and may be rounded at a distance of half a mile. The western side is bordered by a reef which at the southern end extends westward nearly three-quarters of a mile. Shoal water, with one rock awash, extends over one mile westward from the south end of the island.

Anchorage.—Anchorage may be had, in strong north-east winds, in 12 fathoms, about half a mile from the west side of Butauanan island, with the south end of that island bearing S. $51^{\circ} E.$ and the north-west point of the same island N. $31^{\circ} W.$ Another anchorage used by coasting steamers is in 9 fathoms, mud, about three-quarters of a mile south-westward from the south end of Butauanan island. From this anchorage the 50-feet islet previously mentioned should bear N. $69^{\circ} E.$, and the north-west point of Butauanan island N. $26^{\circ} W.$ When approaching this anchorage from the north-westward the foul ground and rock awash, about one mile westward of the south end of Butauanan island, must be avoided.

Coast.—From Kinabukasan point, the coast trends east-south-eastward for about 40 miles to Karamuan point, the north-eastern extremity of the peninsula of that name, and is of very irregular outline, being indented by deep bays and faced by numerous islands, between which and the mainland are several well-protected anchorages. The land rises rapidly from the shore, and is as a rule heavily wooded. There are no towns of any importance on this coast.

San Vicente bay, situated $4\frac{1}{2}$ miles south-eastward from Kinabukasan point, is over half a mile wide at the entrance, and extends over 2 miles south-westward. It is nearly blocked by reefs, and the only available anchorage is in the entrance, southward of the northern entrance point, when the depths are from 9 to 12 fathoms.

Port Tambang, 4 miles south-eastward of San Vicente bay, is 2 miles wide and $2\frac{1}{2}$ miles deep; it is blocked by coral reefs almost to the entrance, and is of no value to navigation.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$.

Cimarron islets are a group of four small high islets lying 12 miles east-south-east from the north end of Butauanan island. The central and largest islet is conical when seen from west or east, but from north or south it shows a short ridge. This group is the nearest danger to the track to and from Maqueda channel, and the course followed by steamers passes over 2 miles northward of it.

LAMIT BAY (*Lat. $13^{\circ} 58' N.$, Long. $123^{\circ} 32' E.$*), with its northern entrance about 16 miles south-eastward from the north end of Butauanan island, is the best typhoon harbour on the east coast of Luzon. It is formed by Sibauan and several smaller islands on the west, the Lamit islands on the east, and a bight in the shore line to the southward. It has an average width of $2\frac{1}{2}$ miles, and extends 4 miles southward; within this area are several small islands, among which anchorage, in from 5 to 9 fathoms, protected from all winds and sea may be found.

Western side.—Sibauan island, with some small islands north-eastward and southward of it, forms the western side of Lamit bay. Sibauan island is about one mile long north-east and south-west and half a mile wide; it is well wooded, and is 165 feet high near the southern end. Shoal water extends about three-quarters of a mile south-westward, and nearly as far westward, from Sibauan island.

Salobot is a small islet lying three-quarters of a mile north-eastward of the north-east point of Sibauan; it is 90 feet high, and has a reef, with a rock awash at its extremity, projecting about a quarter of a mile eastward of it. This reef forms the western side of the northern entrance to Lamit bay.

Paniki islands are three small islands lying about three-quarters of a mile northward of Sibauan island; the north-eastern island is 202 feet high, and they can be safely passed at a distance of a quarter of a mile.

Pagbokavan, the southern islet of the group forming the western side of Lamit bay, lies with its southern extremity over one mile southward of Sibauan. It is well wooded, and 240 feet high. The south end, which terminates in a large dark brown rock, may be passed at a distance of a quarter of a mile.

The other islets of this group do not require description, and their position will be best understood by reference to the chart.

Aguda rock is a small rocky ledge with a least depth of 2 fathoms over it, lying about one mile northward of Paniki islands. Except under the most favourable conditions it cannot be distinguished by the colour of the water, and it breaks only in bad weather.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E.

Eastern side.—Lamit islands are two heavily-wooded islands separated by a narrow impassable channel. Together they are about 4 miles long north and south, and of very irregular shape; the northern island is 260 feet, and the southern 380 feet high. The north shore of the northern island has bold rocky points at either end which slope downward to a low level at a point one-fourth the distance from the north-western point. Two small islets, 50 and 60 feet high, respectively, both of which are clean and steep-to on their seaward sides, lie off the north end of the northern island.

Islands in Lamit bay.—There are several small islands in Lamit bay, the principal of which are the two Bani islands and Anchor island. The western Bani island lies about a mile south-westward of the north-west point of the northern Lamit island, and Anchor island lies about one mile southward of the western Bani island.

Dangers.—A shoal patch, with one foot of water over it, lies three-quarters of a mile southward of the east end of the western Bani island, and a wide reef extends southward from the eastern Bani island. A patch of 2 fathoms lies a quarter of a mile north-westward of the south-west point of Anchor island, from which point a long shoal projects to the northward. A sunken rock, with less than 6 feet water on it, lies about midway between Anchor island and Pagbokavan islet, to the westward.

Anchorage.—Good anchorage will be found southward of the western Bani island, in 7 or 8 fathoms, mud; also southward and south-westward of Anchor island in from 4 to 8 fathoms, sticky mud bottom; *see also* Directions.

Directions.—Vessels approaching Lamit bay from the westward should bring the opening between Pagbokavan islet and the main to bear S.E., and steer for it until the south end of Pagbokavan islet bears S.E. by E., when haul a little to the eastward to pass about a quarter of a mile southward of Pagbokavan; continue eastward, and anchor anywhere southward of a line drawn between Pagbokavan and Anchor island; *see* Anchorage.

Vessels from the eastward usually enter Lamit bay by the north channel. The water is deep close to the islet near the east side of the entrance, and it can be safely rounded at a distance of a quarter of a mile, and the next point southward on Lamit island passed at the same distance. By keeping towards this side of the channel, which is about one-third of a mile wide, the reefs extending from Salobot island will be avoided. The west end of the western Bani island (*Lat. 13° 59' N., Long. 123° 33' E.*) can be rounded at a dis-

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. tance of a quarter of a mile and anchorage taken up southward of it at a quarter of a mile from the shore or a little farther southward, but not farther eastward; *see Dangers.*

If proceeding to an anchorage nearer the head of the bay, pass about a quarter of a mile eastward of Anchor island and haul to the south-westward, where ample space will be found for many vessels.

Should the weather be such that there is difficulty in recognising the northern entrance, a vessel should continue westward, passing northward of the Paniki islands at the distance of a quarter of a mile until the largest Cimarron islet bears N. $1^{\circ} E.$, when the course should be altered to S. $1^{\circ} W.$, to pass a little over a mile westward of Sibauan island, and when the south end of Pagbokavan bears S.E. by E. steer to pass a quarter of a mile southward of it, and as before directed.

Binagasbasan bay is a large bay of irregular shape lying between Lamit islands and Kinalasag island. Malabungat island, lying on the edge of the shore reef, forms the head of the bay. This bay is open northward, and of no value to navigation, the anchorage area being exposed and encumbered by shoal patches.

Hervor rock, awash at low water, lies about $2\frac{1}{4}$ miles N. $57^{\circ} E.$ from the north-eastern extreme of the northern Lamit island. It is surrounded by deep water, and breaks continuously with a light swell.

Kinalasag island (*Lat. $13^{\circ} 57' N.$, Long. $123^{\circ} 38' E.$*), with its northern extremity $3\frac{1}{2}$ miles eastward of the northern Lamit island, is 5 miles long north-east and south-west, very irregularly shaped, and heavily wooded. Its ridges attain a much greater elevation than those of the surrounding country, rising in places to nearly 800 feet; it makes a good landmark. The north-eastern and eastern sides are clean; on the northern side are several indentations, among them Masamat bay, with depths of from 2 to 9 fathoms, which would serve as a good typhoon shelter for small craft.

Bakakay island, over 200 feet high, lies immediately northward of the north point of Kinalasag island, of which it appears to be part when seen from some directions. It is an excellent landmark when seen from westward or eastward, as from those directions it shows as two twin peaks of nearly equal height. Projecting northward from it is a narrow dike-like ledge of rocks, ending in a rock awash at about a quarter of a mile northward of the island, which can be closely approached. A reef with an islet on it extends three-quarters of a mile westward from Bakakay.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$.

Kinalasag passage, southward of Lamit, Malabungat, and Kinalasag islands connects Lamit and Sisiran bays. It is one fathom deep in the western part, and is too shoal and obstructed by reefs for anything but small boats.

Sisiran bay, south-east of Kinalasag island, is clean and capacious, and has good anchorage sheltered by high ground. The entrance, open to the north, is $1\frac{1}{2}$ miles wide, and has a depth of 11 fathoms between Kinalasag and the edge of the reef which surrounds Tinahuagan point, the eastern entrance point, to a distance of 2 cables. Within the port the depth of water decreases gradually from 11 fathoms at the mouth to 2 fathoms close-in, bottom sand and mud, near the shore. There is good sheltered anchorage in from 4 to 5 fathoms in a bight on the south-east side of Kinalasag island, and also in 7 fathoms south-westward of Tinahuagan point.

Water can be obtained on the eastern shore, but no provisions are procurable.

The best channel into Sisiran bay is between Kinalasag island and Laja islet, a dark bare rock, 20 feet high, lying about $1\frac{1}{4}$ miles off the north-east side of Kinalasag and off the middle of the entrance. The depth in this channel is 15 fathoms.

Shoal.—A shoal which breaks in bad weather, covered by a depth of $4\frac{1}{4}$ fathoms, lies between Laja islet and Tinahuagan point.

Karamuan peninsula is the name given to that portion of Luzon lying between the Pacific and Lagonoy gulf. It is 10 miles wide between Sisiran bay and the head of Lagonoy gulf, and extends about 20 miles eastward, terminating in a broad point facing Maqueda channel. It is mountainous, and well wooded.

Tagun bay (*Lat. $13^{\circ} 56' N.$, Long. $123^{\circ} 46' E.$*), between Tinahuagan point and Lahuy island, is about $6\frac{1}{2}$ miles wide, and extends $4\frac{1}{2}$ miles south-eastward. The long tongue of land terminating in Tinahuagan point, which separates Sisiran and Tagun bays, is formed of broad ridges covered with grass, with narrow, steep, wooded valleys between them. Broad coral reefs fringe the western shore of the bay, and also obstruct the head. On the eastern side of the bay deep water can be carried close up to the islands and projecting points.

Northward of the reef at the head of the bay are two patches of 3 fathoms, $1\frac{1}{2}$ miles apart east and west, with deep water between them; a shoal of $3\frac{1}{2}$ fathoms lies $2\frac{3}{4}$ miles S. 82° E. from Tinahuagan point, and a patch of $6\frac{1}{2}$ fathoms lies 3 miles N. 62° E. from the same point.

General charts 943, 1263. —

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E.

If desired, anchorage can be found off the rocky bluff point on the west coast of Lahuy island, about 2 miles south of the Sugar Loaf. Two small channels, with depths of $3\frac{1}{2}$ and 12 fathoms, connect the head of Tagun bay with the Maqueda channel, but they are too narrow and tortuous, in the absence of marks, to be of any practical value.

Lahuy island, situated with its north-east point $12\frac{1}{2}$ miles N. 30° W. from the north-east extremity of the Karamuan peninsula, is about 5 miles long north and south and about one mile broad. A ridge about 400 feet in height extends north and south in the southern half of the island, while the northern half is composed of a number of peaks covered with grass and a few scattered trees. Its north-western extremity terminates in a remarkable round-topped, steep, wooded peak, 325 feet high, named the Sugar Loaf, which is a good landmark.

A number of small islets and rocks lie off the western and northern sides, and the eastern side is fringed by a reef, which near the northern end of the island extends nearly 2 miles eastward, and surrounds Basot and Kovitas islands. The northern shore is formed by sandy beaches and rocky cliffs alternately, and several small rocks lie off the north-east point. Immediately north of the Sugar Loaf are two large rocks, 50 and 79 feet high, respectively.

Okata island lies about half a mile northward of Lahuy island. It is about $2\frac{1}{2}$ cables long east and west by 2 cables broad and 81 feet high; its northern side is rocky and the southern sandy. *See view c*, at page 536.

LIGHT (*Lat. $13^\circ 59'$ N., Long. $123^\circ 50'$ E.*).—A white fixed light, elevated 125 feet above high water, and visible 12 miles in clear weather, is exhibited from a white frame structure, 33 feet high, on the summit of Okata island. For arc of visibility, *see* Light list.

Rocks.—About half a mile eastward of Okata island are three rocks, each about 3 feet high, and about a quarter of a mile south-eastward of the island is a rock 7 feet high.

Masnou islet, lying $3\frac{1}{4}$ miles north-west from the Sugar Loaf, is small, covered with grass, and rises to a height of 87 feet.

Rocks.—Molar rock, lying three-quarters of a mile N. 19° W. from Masnou islet, is 20 yards in extent and about 20 feet high; at about one-third of a mile north-north-west of it is a rock awash, on which the sea breaks heavily in bad weather. About a quarter of a mile south-eastward from Molar rock is a small rock 15 feet high, and between this rock and Masnou islet there are sunken rocks on which the sea frequently breaks.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$.

Black islet is a bare rock about 50 yards in extent and 30 feet high, lying nearly one mile south-eastward of Masnou islet; the channel between them and also that between Black islet and the Sugar Loaf, about $2\frac{1}{4}$ miles wide, is deep and clear. The northern channel, between Masnou and Black islet, is the one generally used by coasting steamers.

Basot and Kovitas islands, situated on the reef extending nearly 2 miles eastward from Lahuy island, lie close together, and from a distance appear as one island. Basot may be passed at the distance of one mile. In the northern part of Basot is a grassy peak 155 feet high, and in the southern part a flat-topped hill 168 feet high; the shores are sandy beaches and rocky cliffs. Basot island is covered with grass, while Kovitas, lying immediately westward of its south end, is covered with trees. Westward of Basot island, between the reef on which it stands, and Lahuy island, is a fairly good anchorage in about 8 fathoms, known as Pocket bay, exposed to north-east winds. A rock awash lies a short distance off the north end of Basot.

Luksuhin islands are a group of islands and rocks lying on one great reef, parts of which dry at low water, situated between Lahuy island and the Karamuan peninsula. They are moderately high, the highest being 210 feet, and covered with bushes, trees, and cocoanut palms. From seaward they appear as one, but at high water a boat can pass between them. Northward and south-westward of them are channels leading to Tagun bay (*see page 569*).

Solodon islet, the south-easternmost of the Luksuhin islands, is a large barren rock 91 feet high, with a few bushes on the top; it forms a useful landmark for entering Tabgon anchorage. About one mile eastward from Solodon islet is a shoal of 6 fathoms, on which the sea has been seen to break in heavy weather.

Coast.—From Tinahuagan point the coast trends south-eastward for 12 miles to Yopokit point, and is fronted by wide reefs dry at low water, which extend a distance of 3 miles in one place. Numerous rocks and islets lie on this reef, one of the latter, named Cocos, is $7\frac{1}{2}$ miles from Tinahuagan point, and $1\frac{1}{2}$ miles from the mainland; it is small, with a rounded summit 127 feet high, and entirely covered with cocoanut trees, and is used as a mark for entering Tabgon anchorage.

Tabgon anchorage; islands and dangers.—Haponan island (*Lat. $13^{\circ} 50' N.$, Long. $123^{\circ} 51' E.$*), lying about one mile westward of Yopokit point, and eastward of Tabgon village, is about a mile long north and south and three-quarters of a mile broad at the northern end. It is composed of a number of small peaks, the highest

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$. being 202 feet, covered with grass, bushes, and cocoanut palms. Reefs extend half a mile north-eastward from it, and form part of the south side of the channel into Tabgon anchorage.

Puling island, lying northward of the west end of Haponan, is about 3 cables in extent, and is the highest island in the vicinity, rising to an elevation of 298 feet. It is well wooded, except where it has been cleared on the northern part of the top, and forms a good landmark. Its northern side is fringed by a reef, which borders the south side of the channel into Tabgon anchorage; near the edge of this reef and little more than a cable from Puling island is South islet, 28 feet high, and covered with trees.

North islet (*Lat. $13^{\circ} 51' N.$, Long. $123^{\circ} 51' E.$*), lying $2\frac{1}{2}$ cables northward of South islet, is situated on the southern edge of the reef surrounding the Luksuhin islands, and is very small, 14 feet high, and covered with grass and bushes. This islet and South islet mark the channel into Tabgon anchorage, which passes between them, and is here about $1\frac{1}{2}$ cables wide between the 5-fathoms lines.

Within an area formed by a line drawn eastward from the north end of Puling island and one drawn N. 17° W. from Karamuan point, the bottom is very irregular, with depths of from $3\frac{1}{2}$ to 21 fathoms. In heavy north-east weather the sea breaks on some of the shoaler patches, and this area should be navigated with caution.

Reef.—About $3\frac{1}{2}$ cables westward of the west side of Puling island is a reef about a quarter of a mile in extent, covered by a least depth of 4 feet.

Anchorage.—Tabgon anchorage is situated $1\frac{1}{2}$ miles north-eastward of the village of Tabgon and westward and south-westward of Puling island. It affords a fairly large anchorage area in which the depths are from 4 to 16 fathoms, mud and sand, completely protected from the sea, but exposed to northerly and north-westerly winds, which sometimes cause a choppy sea in the more exposed parts. The best anchorage is westward or south-westward of Puling island, close enough to clear the reef to the westward. In the north-east monsoon vessels may anchor close to Puling island, the water being deeper there than farther off. The depth in the entrance to the anchorage is 11 fathoms.

Directions.—Vessels bound for Tabgon anchorage, while outside the danger limit mentioned above, should bring Puling island to bear S. 86° W., and steer for it. When about half a mile southward of Solodon islet, bring the south side of North islet in line with the south side of Cocos islet, N. 81° W. This mark will clear the reefs on both sides, but a good lookout should be kept for them, and it is

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. advisable after passing the reef point on the south side, to open the mark a little southward, so as to give the reefs on the northern side a wider berth. As North and South islets are approached, steer to pass midway between them, and when they are abeam haul a little southward to avoid a reef, with $1\frac{1}{2}$ fathoms on it, lying 2 cables southward of North islet; a reef with rocks awash also extends about a cable westward of South islet; anchorage may be found anywhere inside or as described above. See Anchorage.

Tabgon (*Lat. $13^{\circ} 50' N.$, Long. $123^{\circ} 49' E.$*).—The village of Tabgon lies on the shore about $9\frac{1}{2}$ miles south-eastward of Tinahuagan point, at the foot of a noticeable hill, 617 feet high. This hill, the highest in the vicinity, is very steep on the south side, and has a ridge extending east and west; the southern side is covered with grass, and the northern side is heavily wooded. The reef in front of the village extends three-quarters of a mile or more. Tabgon is a port of call for some of the smaller coasting steamers.

Coast.—From Yopokit point the coast trends east-south-eastward, with a bend southward—forming Port Karamuan—for $4\frac{1}{2}$ miles to Karamuan point. Yopokit point is fringed by reef to a distance of about half a mile, which narrows in to the coast a short distance southward. Port Karamuan is used as a landing place for the town of Karamuan during the south-west monsoon. The village of Paniman stands at the head of the port.

Malarad islets are a group of six or seven small high islets and rocks, partly wooded, with steep rocky sides, lying off Port Karamuan.

Karamuan point, the north-eastern point of the peninsula of the same name, is about 400 feet high. It has steep rocky bluffs about 50 feet high, and is bold and steep-to. Behind the point are innumerable small heavily-wooded peaks, from 600 to 1,000 feet in height, the highest of which, situated $3\frac{1}{2}$ miles westward of the point, is easily recognised, and forms a good landmark.

Coast.—From Karamuan point the coast trends south-eastward for $5\frac{1}{2}$ miles to Rungus point, which forms the south-eastern point of the Karamuan peninsula; it is very rugged and irregular, and is cut into by a number of small bays with sandy beaches and rocky bluffs. Numerous small islets and rocks lie at a distance of three-quarters of a mile or less from the shore. The interior is hilly, rising to heights of from 300 to 700 feet a short distance inland. There are no sheltered anchorages on this part of the coast, except Pitogo bay, which is sometimes used as a harbour of refuge for small vessels.

Katanaguan islands are two small islands lying $2\frac{1}{2}$ miles eastward of Karamuan point; they are surrounded by deep water, and

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$. have a deep, narrow channel between them. The northern island is covered with bushes and grass, and is 85 feet high. About 2 cables northward of this island is a small rock, 3 feet high, and a similar rock lies one cable eastward of the island. A small detached shoal of 5 fathoms lies about half a mile westward of the northern island.

The southern island is about 102 feet high, and covered with trees and bushes. Off the south end of the island is a bare pyramidal rock 72 feet high, which shows plainly from east or west. A small detached shoal, with a least depth of 3 fathoms and deep water around, lies about 4 cables west-south-west from the south point of the southern island.

Taebun channel, separating the Katanaguan islands from the Karamuan peninsula, is deep, about $1\frac{1}{2}$ miles wide at the narrowest part, and is frequently used by vessels bound for the east coast of Luzon.

Pitogo bay.—Limited anchorage, in from 7 to 10 fathoms, may be found in Pitogo bay, one mile south of Karamuan point, situated about west from the southern Katanaguan island, and fronted by Pitogo island. When making for the anchorage, pass along the northern shore at the distance of about a cable, until it trends sharply to northward, forming the northern bight; then head for some light grey stones in the bank on the western shore just to the northward of the western small bight. Anchor in 10 fathoms, muddy bottom, with the north end of Pitogo island (southern entrance point) bearing East.

In typhoon weather small vessels should moor in the northern bight, with anchors off each quarter and the bow anchor well to the northward; the bight is not wide enough to permit swinging. The main bight is open between N.E. $\frac{1}{2}$ E. and E. by N., admitting considerable sea. Small vessels can get far enough round Pitogo island to have good protection from wind and sea; they may also moor immediately to the south-westward of Pitogo island. The channel southward of Pitogo island is nearly blocked by reefs.

The rise and fall of the tide here is about $4\frac{1}{2}$ feet.

Sombrero islet, situated $3\frac{1}{2}$ miles south-eastward of Pitogo island and $1\frac{1}{4}$ miles north-eastward of Rungus point, is a small wooded cone, 265 feet high. It is conspicuous, and being higher than the adjacent coast forms a good landmark for vessels approaching the Maqueda channel. Two large rocks, 35 and 40 feet high respectively, lie about 3 and $5\frac{1}{2}$ cables southward from Sombrero islet.

Rungus point (*Lat. $13^{\circ} 42' N.$, Long. $123^{\circ} 58' E.$*), the south-eastern extreme of the Karamuan peninsula and the western entrance

General charts 243, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E. point of the Maqueda channel, is well wooded, of moderate height, and slopes gradually to the sea.

Maqueda channel, separating Katanduanes island from Luzon, is nearly 4 miles wide at the southern entrance, between Rungus point on Luzon and Sialat point, Katanduanes. The southern entrance is divided into two deep and clear channels by the Palompon islands. The western channel is $8\frac{1}{2}$ cables wide, with a depth of over 40 fathoms in the middle.

In the northern part of the Maqueda channel there are numerous rocks and shoals, the westernmost of which, Dagat rocks, are separated from Basot island by a deep clear channel about 6 miles wide. These dangers are described later.

KATANDUANES ISLAND, forming the eastern side of the Maqueda channel, is about 35 miles long north and south, and 23 miles in width, and is traversed throughout its length by a chain of mountains. It is abundantly supplied with small rivers, from the sands of which the natives obtain gold dust. The soil is fertile and produces rice, maize, sesame, indigo, cotton, and hemp; and there is good pasture for horses and oxen.

The northern side is fringed with reefs; the west side is, in general, safe and steep; the south side is fronted by a number of shoals and reefs; the east coast has a rugged and irregular outline with numerous small bights and bays, and it can be safely navigated by keeping a mile or $1\frac{1}{2}$ miles from the headlands.

Yog point (*Lat. $14^{\circ} 6' N.$, Long. $124^{\circ} 12' E.$*), the northern extremity of Katanduanes island, is about 150 feet high, and covered with grass and a few shrubs. Immediately northward of the point is a small grass-topped rocky islet, 144 feet high, on the northern part of which is a pinnacle rock which rises to a height of about 120 feet, and forms a conspicuous object when seen from east or west. This islet is steep-to, and may be rounded at a distance of a quarter of a mile.

North coast.—From Yog point the coast trends southward and then westward to Pandan point, $4\frac{1}{2}$ miles distant, forming Pandan bay; thence westward one mile to Balangona point, the north-western point of Katanduanes island.

Abriop bank is a large bank with depths of from 16 to 20 fathoms, lying from 8 to 12 miles northward of Pandan point.

Pandan bay is nearly blocked by reefs and islets. A small peninsula, with two hills about 70 feet high on it, extends northward from the middle of the bay, dividing it into two parts; the eastern part is foul, and the western is used as the fine weather anchorage

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. for Pandan. A reef extends about half a mile from the western side of the peninsula, and on the reef in the western part of the bay are two small islets covered with cocoanut trees. Between the eastern islet and the peninsula is a sandy beach intersected by two small streams. The depth in the western part of the bay is from 8 to 14 fathoms.

Shoal.—A shoal of $5\frac{1}{2}$ fathoms lies about $1\frac{1}{4}$ miles northward of the head of the western part of the bay, off the middle of the entrance to it. Banks of 7 and 9 fathoms lie a short distance north-westward and eastward respectively of the shoal.

Directions.—Approaching Pandan from the eastward, bring the eastern islet before mentioned to bear S. 27° W. and steer for it, anchoring when the northern extreme of the peninsula bears N. 84° E., in 12 or 13 fathoms. Small vessels wishing to go closer in should steer S. 17° E. from the above position, and anchor in 9 fathoms, with only room to swing clear of the reefs.

From the westward bring the north end of the peninsula to bear S. 79° E. and steer for it until the eastern islet bears S. 27° W., when proceed as before directed. Pandan bay offers no protection during the north-east monsoon; at that season Kobo bay, 3 miles southward of Balangona point, affords sheltered anchorage for vessels wishing to communicate with Pandan.

Pandan is a small town situated about a quarter of a mile inland from the head of the western bay. It is nearly hidden by trees, only the top of the church being visible on certain bearings.

Palumbanes islands are a group of three islands and several islets and rocks situated from 4 to 7 miles west-south-west from the north-west point of Katanduanes island.

Porongpong (*Lat. $14^{\circ} 1' N.$, Long. $124^{\circ} 2' E.$*), the central and largest of the group, is about a mile in extent, of irregular shape, covered with high trees, and rises to a height of 436 feet. There is a small village on the eastern side. Kalabagio, the eastern island, is small, wooded, and 184 feet high. Fair anchorage, approached either from north or south, may be had in 15 fathoms, about a quarter of a mile westward of the south end of Kalabagio.

The western island of the group, lying about three-quarters of a mile from Porongpong is about 55 feet high and wooded. The channel between it and Porongpong has a depth of $6\frac{3}{4}$ fathoms.

DANGERS.—Within a radius of 6 miles from Palumbanes there are a number of rocks and shoals situated as follows:—

Lane rocks, the most northern danger in this vicinity, are a group of four or five rocks awash, lying 5 miles N. 12° W. from the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. western Palumbanes island. They can be seen at all times, and are surrounded by deep water, except on the northern side, where, at the distance of half a mile there is a patch of 2 fathoms. The passage between Lane rocks and the shoal spots northward of the Palumbanes is deep and about 3 miles wide.

North-westward one mile from the western Palumbanes is a patch of $1\frac{1}{2}$ fathoms and $1\frac{1}{2}$ miles northward of the largest island there is a patch of 2 fathoms. Other patches exist within the above distances, the depth on which is not more than $3\frac{1}{4}$ fathoms.

Dagat rocks.—South-westward from the Palumbanes is a coral reef about 6 miles long north-north-west and south-south-east, and about a mile wide within the 10-fathoms limit. The northern limit is $4\frac{1}{2}$ miles W. by S. from the highest part of Porongpong, and the southern limit is 7 miles S. by W. $\frac{1}{2}$ W. from the same point. Near the northern part of the reef are the Dagat rocks, a cluster of rocks about 6 feet high. A patch of 4 fathoms lies about half a mile south-eastward of the rocks, but northward of them it is clear. About $1\frac{3}{4}$ miles S. 26° E. from Dagat rocks is a small patch awash; in calm weather it cannot be seen from any distance. Excepting in the vicinity of the places mentioned the reef has from $4\frac{1}{2}$ to 9 fathoms over the greater part of its length.

Shoal.—About midway between the eastern Palumbanes island and Katanduanes there is a shoal about $2\frac{1}{2}$ miles long, with a rock awash at its northern end, from which the northern end of Kalabagio island bears S. 70° W., distant $1\frac{3}{4}$ miles, and about $1\frac{1}{2}$ cables eastward of the rock there is a shoal spot which breaks when there is any swell. The remainder of the shoal is covered by depths of from $2\frac{1}{2}$ to 7 fathoms. The channel between the shoal and Katanduanes is about $1\frac{1}{2}$ miles wide, with a least depth of 7 fathoms.

Sail rock (*Lat. $13^{\circ} 59' N.$, Long. $124^{\circ} 4' E.$*), situated about $1\frac{1}{2}$ miles south-south-eastward of Porongpong island, is 65 feet high, and forms a conspicuous mark. It is about 45 yards in extent, and has a few bushes on it. Northward of the rock and extending to a distance of about one cable are several small rocks, about 8 feet high, and about half a mile south-westward is a patch of 2 fathoms.

Rock.—A small rock, awash, lies about 3 miles S. 24° W. from Sail rock; when the sea is smooth it is not very noticeable.

West coast of Katanduanes.—**Balangona point**, the north-western extremity of Katanduanes island, is 100 feet high, steep-to, with rocky bluffs, and covered with grass. From this point the coast trends southward for 18 miles, and then south-westward for $8\frac{1}{2}$ miles to Sialat point, and

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. is in general bold and steep-to, the 10-fathoms line being nowhere half a mile from the shore. There are no ports of consequence on this coast; the bay immediately southward of Balangona point does not afford anchorage, being contracted by reefs and shoal water.

Kobo bay, the next bay southward, is sometimes used by vessels wishing to communicate with Pandan in the north-east monsoon. Anchorage may be found in 15 fathoms, sand, with a round, timbered hill, 284 feet high, near the beach bearing East; the hill is at the southern end of some high land. The anchorage is not good in heavy weather, as the swell comes round Balangona point. Small vessels, not more than 150 feet in length, can find better shelter farther in, in a pocket in the reef, in 4 or 5 fathoms, sand. The village of Kobo lies among trees at the head of the bay.

Toytoy point, the southern point of Kobo bay, is a sharp-pointed, partly-wooded neck of land, 73 feet high; its shores are rocky, with a bluff 50 feet high. About $1\frac{1}{2}$ cables southward of the point are two rocks, the higher of which is 18 feet.

Karamoran, situated one mile southward of Toytoy point, is a small town at the foot of two hills. The stone church forms a good landmark. The beach in front of the town is bordered by a reef $1\frac{1}{2}$ cables wide, on which the sea breaks, making landing difficult and at times impossible.

Port Manambrag is a small bay lying on the south side of Manambrag point, 100 feet high, lying $6\frac{1}{2}$ miles north-eastward of Sialat point. It is shoal and rocky at the head, and there are rocks awash just south of the point. Steamers call here to load hemp. The depths in the port are from 5 to 10 fathoms, and anchorage may be had in 8 fathoms about 2 cables south of Manambrag point.

At about $2\frac{1}{2}$ miles south-westward of Manambrag point and half a mile off-shore is a rock awash, with a patch of 4 fathoms half a mile north-east of it; another rock awash lies near the shore, $2\frac{1}{4}$ miles from Sialat point; with these exceptions the coast between Port Manambrag and Sialat point is clean and steep-to.

Sialat point, the south-western extremity of Katanduanes island is a high, bluff, rocky point, with two or three rocks awash at high water off it. The water off the point is deep, there being 20 fathoms at a distance of a quarter of a mile.

LIGHT (*Lat. $13^{\circ}40'N$, Long. $124^{\circ}2'E$*).—A white group occulting light, showing two eclipses every thirty seconds, thus:—light, *seventeen seconds*; eclipse, *three seconds*; light, *seven seconds*; eclipse, *three seconds*, visible 12 miles in clear weather, is exhibited, at an elevation of 353 feet above high water, from a white wooden

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. framework tower, 33 feet in height, on Sialat point; for arc of visibility, see Light list and chart.

South-west coast.—**Agojo point**, about 4 miles south-eastward of Sialat point, is a mangrove swamp, surrounded by a coral reef about a quarter of a mile wide. The bight northward of the point is filled with reefs, and at $2\frac{1}{2}$ miles northward of the point and half a mile off-shore is a reef with a least depth of $1\frac{1}{2}$ fathoms on it.

Kalolbong is a small town situated about 3 miles eastward of Agojo point. The approach is clear, except for a patch of $1\frac{3}{4}$ fathoms lying three-quarters of a mile S. 54° W. from the landing place.

Anchorage, protected from winds between west, through north, and east-south-east, may be found about three-quarters of a mile from the shore in 10 fathoms. Vessels usually bring the group of warehouses to bear N. 35° E., and steer for them, anchoring as close to the reef as is prudent.

Telegraph.—The cable from Tabako is landed at Kalolbong.

Coast.—From Kalolbong the coast trends south-eastward for 8 miles to Virak point, and is generally fringed by coral reefs less than half a mile in width.

SHOALS.—**Teresa bank**, with a least depth of 2 fathoms on it, lies 3 miles S. 7° E. from Kalolbong; it is half a mile in diameter, and is surrounded by deep water.

Taguntun bank, half a mile in extent, with a least depth of $4\frac{3}{4}$ fathoms over it, lies 5 miles S. 14° E. from Kalolbong. Virak point, bearing E. $\frac{1}{2}$ N., leads southward of the shoal.

Between the two last-mentioned banks and the shore there are several shoal spots, for which *see* the chart.

A bank, on which the least known depth is 8 fathoms, lies about 5 miles S. 70° W. from Virak point. Vessels rounding Virak point will find a good channel northward of this bank and Pechili reef.

Pechili reef, on which the sea breaks in heavy weather, is situated about 2 miles south-westward from Virak point. It is about half a mile long, and has a least depth of $2\frac{1}{2}$ fathoms.

About one mile south-eastward from Pechili reef, there is a small shoal patch on which the sea rises when there is much swell. The least depth found was 6 fathoms, but vessels should avoid this locality. Virak point and church in line pass over the eastern edge of this shoal.

Virak bank (*Lat. $13^{\circ} 29' N.$, Long. $124^{\circ} 16' E.$*), on which the sea breaks heavily in bad weather, is a large bank with 5 fathoms over it, lying 4 miles S. 60° E. from Virak point.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 50' E.

Kabugao bay, on the south side of the island, is $7\frac{1}{2}$ miles wide between Virak and Nagumbuaya points, and extends $3\frac{1}{2}$ miles northward, with a depth of 21 fathoms in the middle of the entrance, shoaling gradually to 5 fathoms near the shore. The west point of the bay is low and bordered by rocks; from the western shore, northward of the point, shoal water extends $1\frac{1}{2}$ miles eastward. The shore of the bay is in general a gravel and sand beach, bordered much of the way by reefs, widest near the town of Virak. The Pajo river discharges in the western part of the bay, and the Kabugao in the north-eastern. The town of Virak is situated in the north-west part of the bay, and the village of Kabugao in the north-eastern, near the mouth of the Kabugao river.

Dangers.—**Johns reef**, which breaks heavily, and is covered by about 4 feet water, is a small detached shoal lying about 2 miles east-north-east of Virak point. A small detached rock, with $4\frac{1}{2}$ fathoms on it, lies one mile E. by S. from Johns reef, with Virak church bearing N. 28° W.

A small shoal of 2 fathoms lies about $1\frac{1}{2}$ miles south-eastward of the town of Virak.

A rocky patch about one cable in extent, covered by a least depth of 6 feet, is situated about $1\frac{4}{10}$ miles southward of Kabugao village and about 3 miles eastward of Virak.

Virak (*Lat. $13^{\circ} 35' N.$, Long. $124^{\circ} 14' E.$*).—The town of Virak is situated about 4 miles north-north-eastward of Virak point. It is the principal port in the island for the shipment of hemp.

The anchorage off Virak has depths of from 5 to 8 fathoms.

Directions. — Virak church, which is conspicuous, kept on a N. 36° W. bearing, leads eastward of Johns reef and the rock eastward of it and westward of the shoal of 2 fathoms. Coasting steamers generally steer for it on that bearing, and anchor in 8 fathoms about half a mile from the shore. Small craft can anchor in 6 fathoms in a break of the reef, about $1\frac{1}{2}$ cables from the beach, but the swinging room is very limited.

Bato.—The town of Bato is situated about one mile inland on the Kabugao river, which discharges about 3 miles eastward of Virak. It has a large church, which makes a good landmark. The usual anchorage for Bato is in front of the village of Kabugao, in 6 fathoms, avoiding the patch of 6 feet mentioned previously.

Tides.—It is high water, full and change, at Kabugao bay, at 6 hours; springs rise 6 feet.

East coast of Katanduanes.—Bank.—At one mile N. 64° E. from Yog point, the north extreme of the island, is a small

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. coral bank on which the least depth is 7 fathoms. The channel between the point and the bank is clear, with 16 fathoms in the middle.

Horadaba rocks (*Lat. $14^{\circ} 7' N.$, Long. $124^{\circ} 17' E.$*) are three large bare rocks, situated $4\frac{1}{2}$ miles N. 83° E. from Yog point; they lie close together, and from most directions appear as one. The centre rock is 105 feet high, and has a light growth of brushwood on the summit.

Matulin rock lies 6 cables south-eastward of Horadaba rocks; it is bare, slightly spherical in shape, and 40 feet high. Between Horadaba and Matulin rocks there are four rocks awash and numerous others sunken.

Coast.—From Yog point the coast trends south-eastward for $7\frac{1}{2}$ miles to Bugao point, and has numerous cliffy projections but no prominent points. It is bordered by a narrow reef steep-to. Two small coves, Tabago and Miali, lie 3 and $4\frac{1}{2}$ miles respectively from Yog point. Tarahid point, 50 feet high and rugged, lies 5 miles from Yog point.

Purog bay, half a mile southward of Tarahid point, is almost blocked by reefs, leaving two narrow boat channels to the head of the bay.

Minigil island lies in the entrance to Purog bay, and is connected with the shore at the head of the bay by a reef awash at low water. The island is rugged, and on all sides, except the western, cliffs rise almost vertically to a height of 140 feet. The summit and western slope are covered with grass and bushes.

Minigil point is high and rocky. From here a large reef, awash at low water, extends $1\frac{1}{2}$ miles eastward, and then curving round southward and westward, joins the shore southward of Bugao point. Outside the eastern part of this reef is a shoal of $2\frac{1}{2}$ fathoms.

Coast.—Bugao point is low, sandy, and covered with bushes and small trees. From it the coast trends southward for 3 miles to the town of Bagamanok, and thence eastward for 4 miles to Anahao point, but the latter stretch is broken by a deep indentation southward, at the mouth of the Oko river. This right-angled gap in the coast is partly filled by Lete, Panay, and some other small islands, and between them and the coast are Port Bagamanok, Babaguan bay, and Port Anajao.

Tahidan point, about 2 miles southward of Bugao point, rises almost vertically to a height of 112 feet, with a sharp top, covered with grass, presenting an appearance not unlike that of a cone. The

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30' E$. point is red-faced and very conspicuous. A large reef, awash at low water, extends three-quarters of a mile north-eastward and one-third of a mile eastward from Tahidan point.

Lete island, about 9 cables long north and south, and nearly half a mile wide, lies nearly one mile eastward of Tahidan point, and is 329 feet high near the northern end. The northern and western sides of the island are bare, reddish-brown, vertical cliffs, some of which reach a height of 275 feet. The southern shore is a sandy beach, whence the land slopes gradually upwards to the centre of the island.

Panay island (*Lat. $13^{\circ} 58' N.$, Long. $124^{\circ} 20' E.$*), the largest island off the east coast of Katanduanes, lies $9\frac{1}{2}$ miles south-eastward of Yog point. It is about $2\frac{1}{2}$ miles in extent, very irregular in shape, partly wooded, and rises to a height of 453 feet. On all sides except the southern, Panay island is fringed with reefs, and should not be approached within one mile. The Makarilan islands are two small, rugged, heavily wooded islands, 90 and 139 feet high respectively, lying close to Makarilan point, the north-western extreme of Panay island; they are surrounded by reefs awash at low water, which connect them with Panay island.

Arch rock, lying about $1\frac{1}{4}$ cables eastward from Ilihan point, near the edge of the shore reef, is a reddish-brown stone arch about 60 feet high. The plane of the arch is nearly east and west, and it forms a good landmark.

Port Bagamanok is about 2 miles long north and south by one mile wide, and lies between Lete island and the main. The anchorage area is much restricted by reefs extending from the shore and from Lete island. It is open northward, and affords no protection during the north-east monsoon. The entrance channel lies between coral reefs awash at low water on the western and a line of sunken rocks on the eastern side.

Danger.—A rock, covered by a depth of one fathom, lies in mid-channel, about two-thirds of a mile N. $21^{\circ} E$. from Arch rock.

Directions.—To enter Port Bagamanok, vessels should round the Makarilan islands off the north-west point of Panay island, at a distance of half a mile, and bring the south-west point of Lete island to bear South and steer for it, keeping a good lookout for rocks on the port hand until Arch rock bears S.W. by S., when it should be steered for, and anchorage taken up about a quarter of a mile eastward of it in 3 or $3\frac{1}{2}$ fathoms, mud. Arch rock, bearing S.W. by S., should carry a vessel midway between the one-fathom rock in mid-channel and the rocks westward of Lete island.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E.

Bagamanok is a small town on the south shore of the port, behind a ridge of gravel covered with brushwood, which almost obscures the town. The church, with stone walls, is the only permanent building.

Babaguan bay is the body of water between Ports Bagamanok and Anahao. It is very shallow, especially in the southern part, where extensive mud-flats uncover at low water. The Oko river, navigable by small boats only, discharges into the southern part of this bay.

Channel.—A narrow channel, with a least depth of $6\frac{1}{2}$ feet, connects Port Bagamanok with Port Anahao; it follows the south-west side of Panay until Arch rock is in line with the south end of Lete island, and then trends westward into Port Bagamanok. It should not be attempted by a stranger unless previously marked.

Port Anahao, between Panay and Katanduanes islands, is a small but well-sheltered harbour of refuge. It is about $1\frac{3}{4}$ miles long east and west, and has a least width of 2 cables, with depths of from 3 to 10 fathoms. The anchorage is in the mouth of Babaguan cove, the second indentation from the entrance, on the south side of Panay; the village of Babaguan lies at the head of the cove. The only entrance to Port Anahao is from the eastward, the western end being blocked by the shoal waters of Babaguan bay and Minaaso islet.

Lolong point, the south-eastern extreme of Panay island, forms the north entrance point of Port Anahao. It is 89 feet high, covered with grass and faced with cliffs about 30 feet high. Komagat rock, about half a cable eastward of the point, is about 18 feet high, with numerous rocks, awash at low water, on all sides of it.

Anahao point (*Lat. $13^{\circ} 56'$ N., Long. $124^{\circ} 21'$ E.*), on Katanduanes island, is the southern entrance point of Port Anahao: it is 100 feet high, and covered with grass. Two islets lie eastward of the point; the outer one is 58 feet high, covered with grass, brushwood, and a few small palms, and lies three-quarters of a cable from the point; the inner islet is a bare rock 28 feet high.

Manyagui rock is a dark-coloured rock, 16 feet high, lying in the middle of the entrance to Port Anahao. It is surrounded by deep water except on the south-western side, and may be passed on either hand, but the usual channel into Port Anahao is northward of the rock, and is over half a mile wide, with a depth of 15 fathoms in the middle.

Entrance.—The shore line of Lolong point, Anahao point, and both sides of the channel through the narrow section of the port, is

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 30' E. bold, well defined by low rocky cliffs and steep-to. On each side of the port, abreast the narrowest part, are heavily wooded hills from 400 to 500 feet high, the steep slopes of which, showing against the hills behind Port Bagamanok, define the entrance clearly.

Rocks.—Several rocks, the outermost of which is awash at low water, extend 130 yards southward from the eastern entrance point of Babaguan cove.

Minaaso islet, lying at the head of Port Anahao, is small, heavily wooded, and 81 feet high; it is surrounded by cliffs and by a reef, which extends $1\frac{1}{2}$ cables in a north-east direction. A small rock 12 feet high and numerous rocks awash lie off the north-east side of the islet.

Directions.—To enter Port Anahao, pass midway between the south-eastern point of Panay island and Manyagui rock, and steer S. 74° W. for the north end of Minaaso islet; on this course Minaaso islet is just open of the shore southward of it. As the narrows are approached, keep in mid-channel, and when the village of Babaguan opens, steer for the western entrance point of Babaguan cove, bearing N. 73° W., and anchor in $3\frac{1}{2}$ fathoms, mud, when the stone building in Babaguan village bears North.

Coast.—From Anahao point the coast trends south-east for 7 miles to Likitin point, and then southward for 4 miles to Dalaynay point, at the entrance of Himoto bay. This stretch of coast is of irregular outline, being indented by numerous bays, and fronted by a number of small islets and rocks. The land is high and bold, and fringed by narrow, steep-to coral reefs. The bays are small and of little value to navigation; their shores are bordered with coral, leaving in most cases a narrow, deep channel to their heads. They are all open northward and eastward, and afford no shelter in the north-east monsoon. The islands and rocks all lie on the shore reefs. All the headlands and islets on this part of the coast can be passed safely at the distance of one mile.

Agutayan island (*Lat. 13° 54' N., Long. 124° 23' E.*), lying close to a point of the same name, $3\frac{1}{2}$ miles south-eastward of Anahao point, is small, 178 feet high, and covered with grass. Numerous rocks, from 5 to 64 feet high and others awash, lie off the north end of the island. Sobog bay lies westward of Agutayan point.

Linampanan island, lying off Sohoton point, one mile south-eastward of Agutayan island, is 139 feet high, small, rugged, and covered with grass. A number of detached rocks from 6 to 68 feet high lie north and east of the island; the easternmost rock, 8 feet

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. high, is a quarter of a mile N. 77° E. from the north end of the island. Botinagan bay lies between Agutayan and Linampanan islands.

Liktin point, lying $2\frac{1}{2}$ miles south-eastward from Linampanan island, is rugged, and 140 feet high. The cliffs are about 75 feet high, and the slopes leading to a 376-foot hill three-quarters of a mile westward of the point are largely covered with grass and small trees. Bocana bay is between Linampanan island and Liktin point.

Bagalayag point, about 3 miles southward from Liktin point, is very conspicuous when seen from north or south. It is composed of rugged cliffs about 75 feet high, and is heavily wooded, with the exception of a small grassy area on the outer end. Rocks from 10 to 40 feet high extend a quarter of a mile eastward from the point. Sigmil bay and three coves lie between Liktin and Bagalayag points.

Pondanan island lies half a mile northward of Bagalayag point; it is small, covered with grass, and 85 feet high. Rocks from 5 to 20 feet high lie south-westward of it.

Shoal.—A shoal, with a least depth of $2\frac{3}{4}$ fathoms, lies northward from Pondanan island. The outer limit of the 10-fathoms curve surrounding the shoal is about one mile north-north-east from the island and the same distance from the shore.

Dalaynay point, about three-quarters of a mile southward of Bagalayag point, is formed of low cliffs, as is the coast between the two points. It is covered with grass, and rises to a height of 310 feet. A heavily wooded hill 430 feet high lies 8 cables south-westward of the point.

Close off the point are the two Dalaynay islets. The northern and larger is 155 feet high, and has rugged cliffs; the southern islet rises to a sharp point 78 feet high; both are covered with grass. Several bare rocks, from 10 to 40 feet high, lie near these islets.

Poro island (*Lat. $13^{\circ}47'N$, Long. $124^{\circ}26'E$*), one-third of a mile south-eastward from the Dalaynay islets, is one of the most conspicuous landmarks on this coast, and points out the entrance to Himoto bay. It has the appearance of a truncated cone 189 feet high; a large single tree stands on the summit. The island is surrounded by a narrow, steep-to reef on all sides except the eastern. There is a navigable channel half a cable wide between Poro island and Dalaynay islets.

Makalanhag island, lying nearly one mile south-westward from Dalaynay point, forms the south side of Himoto bay; it is small,

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. heavily wooded, and 220 feet high. The island is surrounded by a reef, and a reef, dry at extreme low water, connects it with the main. The channel between the reefs surrounding Poro island and those extending north-eastward from Makalanhag island is about half a mile wide, deep and free from danger.

Himoto bay, formed by a curve in the shore-line westward of Dalaynay point, between that point and Makalanhag island, offers excellent anchorage for small vessels in from 4 to 10 fathoms. The inner harbour is oval in shape, extending in a north-west direction, and has a gravel beach. Coral reefs fringe both shores of the bay, but the beach at the head is clean. The channel between the reefs on either side of the bay is 140 yards wide, and is deep and clear; the water shoals gradually to the head of the bay, and the holding ground is good anywhere. The village of Himoto lies at the head of the bay.

Anchorage (*Lat. $13^{\circ}47'N$, Long. $124^{\circ}25'E$.*). — Good anchorage may be found northward of the middle of Makalanhag island, in 9 fathoms, mud, but better protected anchorage will be found farther in towards the village.

Directions.—No directions are necessary for the outer anchorage, which is easy of access. To enter the inner harbour, bring a sharp-pointed distant hill seen over the northern part of Himoto village to bear N. $76^{\circ}W$., and steer for it, keeping a good lookout for reefs on either side; when the western side of Makalanhag island opens clear of the land to the southward, the narrowest part of the channel will have been passed, and a West course will lead to good anchorage in 3 fathoms, mud, in the middle of a basin about a quarter of a mile in diameter. Unless the hill mentioned is positively identified, or the edges of the reefs can be seen, it is not safe to attempt to enter the inner harbour.

Nagsilag point, about $1\frac{1}{2}$ miles southward of Himoto bay, is a grassy hill 140 feet high, connected with the mainland westward of it by a neck of land 50 feet in height. Sogokan cove is northward, and Diyoryan cove southward of the point. Two bare rocks, 19 and 22 feet high respectively, lie two-thirds of a mile north-eastward and half a mile south-eastward from the point, and a small rocky islet, 80 feet high, covered with brush, lies one cable southward from Nagsilag point. About $3\frac{1}{2}$ miles inland from the point the land rises to 2,110 feet in height.

Vitaogan point, three-quarters of a mile southward of Nagsilag point, is the eastern extremity of a heavily wooded ridge extending 3 miles westward. This ridge is very conspicuous, particularly the

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. western portion, including hills of 2,060 and 1,876 feet elevation, and can be seen from the vicinity of Nagumbuaya point.

The valley between Nagsilag and Vitaogan points is remarkable when seen from seaward. Ginitligan cove lies southward of Vitaogan point.

Balakai island, 265 feet high, small, and heavily wooded, lies about $1\frac{1}{2}$ miles southward of Vitaogan point. Reefs, dry at low water, surround the island, and connect it with the shore.

Agban bay, about half a mile wide and two-thirds of a mile deep, has a moderate depth of water, and affords sheltered anchorage during the south-west monsoon. It is somewhat protected from the north-east by Balakai island and its surrounding reef. Vintikayan point, on the south side of the bay, is formed by high rocky cliffs, with a grassy area on its eastern extreme; Polalan bay lies southward of this point.

Binurun point (*Lat. $13^{\circ}40'N.$, Long. $124^{\circ}25'E.$*), about $6\frac{1}{2}$ miles southward of Jimoto bay, is formed of high, dark-coloured, rocky cliffs. A wooded peak, 266 feet high, situated about $1\frac{1}{2}$ cables within the point, shows well from northward or southward. Ginggaanan bay is northward of the point. Zayao island, 6 cables northward of Binurun point, is a bare rock, 80 feet high, connected with the shore to the westward by a reef which breaks in a moderate sea. The island appears to form part of Binurun point when seen from the northward. A rock, 18 feet high, lies $1\frac{1}{2}$ cables south-westward from Tominongtong point, a point one mile south-westward from Binurun point.

Bandayanon point, $2\frac{1}{2}$ miles south-westward of Binurun point, rises gradually on all sides to a height of 249 feet. Pinohagan island, 51 feet high, small and wooded, lies close to the south-west side of Bandayanon point, of which it appears to form part when seen from the southward or westward.

Jumbit islets, consisting of seven small grassy islets and several bare rocks, grouped in a nearly north and south direction, lie from one-third to over one mile S. by E. from Bandayanon point. The larger islets are from 62 to 112 feet in height; the others are mere rocks from 5 to 31 feet high. The group rises from a coral reef which extends from a quarter to half a mile westward and a quarter of a mile eastward of the islets. Good water is found close to the southern side of the 3-foot rock, half a cable southward of the southern islet. The only dangerous part of the reef is near the north-west corner, where depths of 2 and 3 feet are found a quarter of a mile westward of the 31-foot rock.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E.

KALAPADAN BAY, between Bandayanon point and Taris point $2\frac{1}{4}$ miles south-westward, extends about one mile north-westward. The shore is bordered by reefs extending half a mile off in some places. The anchorage depths in the bay are from 7 to 16 fathoms.

Minabalay island, 59 feet high, and wooded almost to the water's edge, lies on the edge of the shore reef about two-thirds of a mile north-west from Bandayanon point.

Reefs.—A small detached reef, with a least depth of 3 fathoms over it, lies 8 cables westward from the 31-foot rock situated one-third of a mile south-westward from Bandayanon point. Another reef, with a least depth of 5 fathoms, lies about one-third of a mile south-westward of the first.

Baras, the largest town on the east coast of Katanduanes island, lies at the head of Kalapadan bay, northward of Minabalay island, and between the mouths of the Makutol and Paniginhan rivers. A white iron roof in the eastern part of the town forms a good landmark, which can be seen from the vicinity of Sinalog point. The anchorage depths off Baras are from 3 to 9 fathoms.

Directions.—Vessels wishing to communicate with Baras should bring the white iron roof in the eastern part of the town to bear N. 1° W. when well southward of Jumbit islets and steer for it, anchoring in 9 fathoms, sand, when Pinohagan island bears N. 89° E. Small vessels may go farther in towards Minabalay island. The channel into the Paniginhan river passes close eastward of Minabalay island.

Taris point (*Lat. $13^{\circ} 38' N.$, Long. $124^{\circ} 21' E.$*), the south-western limit of Kalapadan bay, is not very prominent. Manguinling island, about 40 feet high and wooded, lies just north of the point, and is not readily distinguished from the shore near it.

Kagaray point, three-quarters of a mile south of Taris point, is a narrow, heavily-wooded neck of land 85 feet high, faced with bold, rugged cliffs. Kagaray island, small, low, and covered with grass, lies just north of the point.

Sinaktan point, about one mile south of Kagaray point, extends south-eastward, and is an irregular, heavily-wooded neck of land 175 feet high.

Sinalog point, over one mile southward of Sinaktan point, is the most pronounced point between Kalapadan bay and Nagumbuaya point, and forms the northern limit to Lokot bay. The heavily-wooded slopes rising from this point terminate in a hill 844 feet in height, at two-thirds of a mile north-west from the extremity of the point.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E.

Lokot bay, between Sinalog point and Nagumbuaya point, $1\frac{1}{2}$ miles southward, extends about one mile westward. Its shores are fringed with coral reefs, which, near the middle of the bay, extend eastward and surround the Lokot islands, thus forming two smaller bays. The Lokot islands are small, 81 and 132 feet high respectively, and are composed of perforated rock, covered with bushes. Buti hill is a heavily-wooded hill, 454 feet high, in shape not unlike a truncated pyramid, lying near the western shore of the bay; on its north-west slope is a well-defined hump which shows up well when seen from eastward or westward. The depths in Lokot bay are from 10 to 15 fathoms.

Nagumbuaya point (*Lat. 13° 33' N., Long. 124° 21' E.*) is a narrow strip of land extending from the south-east part of Katanduanes island. It is extremely rugged, especially near the outer end, where rocky cliffs rise abruptly 100 feet or more from the water. Near the eastern end of the point are four hills ranging in height from 211 to 276 feet; westward of these hills the land is low and wooded. From a distance northward or southward this low land is below the horizon, and the outer part of the point appears like an island. Deep water surrounds Nagumbuaya point.

A small rock, 25 feet high and steep-to, lies close to the eastern extremity of Nagumbuaya point.

Tidal streams.—The flood stream sets to the northward, both on the east and on the west side of Katanduanes island, and to the westward along the part of the coast between Katanduanes and Polillo island. There is little information as to the hours of high water.

Winds on the east coast of Luzon.—From Cape Engaño to the bay of San Miguel, north-east winds prevail from October to March, the monsoon here beginning with north winds which are of short duration and soon pass into the north-east; in January and February the east winds begin, and terminate the monsoon. The heaviest rains fall from October to January, and in October and other months of that part of the year, typhoons sometimes occur. In March and April, and sometimes in the beginning of May, variable winds blow, bringing in the south-west monsoon; but the dry season, of which April and May are the driest months, is uninterrupted by rain.

Thunder storms occur from June to November, most frequently in August. During the south-west monsoon the sea is calm, but the weather gets very boisterous during the middle of the north-east monsoon.

COAST of LUZON.—**Lagonoy gulf**, included between Katanduanes island, Luzon, and the islands forming the north side of

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ} 30' E$. Albay gulf, is about 21 miles wide at the entrance between Nagumbuaya point and Rapurapu island, and extends 48 miles in a north-westerly direction. The centre of the gulf is deep and free from dangers.

Northern side.—Palag bay, situated $2\frac{1}{2}$ miles north-westward of Rungus point, is a semi-circular bay about three-quarters of a mile in extent, and affords good anchorage, sheltered from all except south-east winds. The entrance points are clear, but the head of the bay is filled by a reef having a depth of 10 fathoms near its edge.

Guihalo cove lies about 6 miles westward of Rungus point. The head of the cove is filled by a reef, which is steep-to. Anchorage may be had in 22 fathoms southward of Guihalo village, but close in. Port Minas is a small shipping port in a cove half a mile south-west from Guihalo village.

The anchorage is just off the cove; vessels should be careful not to get too far northward, as there are reefs in the bight and along the shore.

Alto point (*Lat. $13^{\circ} 43' N.$, Long. $123^{\circ} 40' E.$*), situated 18 miles westward of Rungus point is moderately high and steep-to. The shore of the north side and head of the gulf may be approached within one mile excepting near Alto point.

Rosa islet is a low, wooded islet, about a cable in extent, lying three-quarters of a mile east-south-east from Alto point. It is surrounded by a reef which extends three-quarters of a mile to the eastward, 3 cables to the southward, and a less distance elsewhere. The reef is steep-to, and there is a clear, deep channel half a mile wide between the islet and the shore. A patch of $1\frac{3}{4}$ fathoms is situated a quarter of a mile to the northward of the east end of the reef.

Alto reef, partly dry at low water, begins half a mile south-west of Alto point, and extends $1\frac{1}{2}$ miles westward, with a width of three-quarters of a mile. The channel between the reef and the shore is half a mile wide, deep and clear. The channel between Alto reef and Rosa islet is nearly one mile wide and very deep. Vessels passing northward of the reef and Rosa islet should favour the Luzon shore, which is clear and steep-to.

Head of the gulf.—Sabang.—The town of Sabang is situated at the entrance of the Lagonoy river, about $4\frac{1}{2}$ miles westward from Alto point. It includes several large warehouses, a large church, and an old stone fort, 30 or 40 feet high. Sabang is the port for San Jose de Lagonoy, the centre of a considerable hemp trade,

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30'E. situated on the Lagonoy river about 4 miles south-westward from Sabang.

Anchorage.—Good anchorage may be had in from 10 to 12 fathoms about half a mile from the shore, with the church bearing between North and N.W.

Coast.—From Sabang the coast trends south-south-westward for $7\frac{1}{2}$ miles to Sangay point, and is low, sandy, steep-to, and intersected by several small streams. From Sangay point a reef, on which there is a small group of rocks, extends half a mile north-eastward.

Sangay town is situated about $1\frac{1}{2}$ miles westward from Sangay point. Vessels anchor about half a mile north-eastward of the village of Nato in 4 or 5 fathoms.

Mount Isarog, *see* page 560.

Atulayan bay, south-east of Sangay point, is $2\frac{1}{2}$ miles wide at the entrance, and extends 2 miles south-westward. It is of very uniform depth, 30 to 40 fathoms, and is free from dangers except a narrow reef fringing the shore, widest in the western part of the bay. In the southern part of the bay good, well-protected anchorage may be found about 4 cables from the shore in 20 fathoms, soft bottom, with Sangay point bearing N. 11° E. and the eastern entrance point of the bay S. 83° E. The bay may be entered on either side of Atulayan island, but if the north entrance is used vessels must keep over to Sangay point to avoid a large reef lying north-westward from Atulayan island; this channel is about half a mile wide.

Atulayan island (*Lat. $13^{\circ} 35' N.$, Long. $123^{\circ} 34' E.$*) lies in the entrance to Atulayan bay, sheltering it from north-east winds; it is 693 feet high, and is a very conspicuous landmark for vessels navigating the north-west part of Lagonoy gulf. It is fringed by a narrow reef, which is steep-to. There are two reefs a short distance from the shore; one with a least depth of 2 fathoms is a quarter of a mile long, parallel with the shore, about a quarter of a mile from the south-west side of the island. This reef must be avoided by vessels seeking an anchorage under the lee of the island and when entering from the eastward. The second reef lies north-west of the island, separated from it by a narrow, deep channel; it is about a mile in length north-east and south-west by half a mile in width, and has a least depth of 7 feet. It reduces by one-half the width of the north entrance to Atulayan bay.

Anchorage.—Fairly protected anchorage may be found off the west point of Atulayan island in about 23 fathoms.

General charts 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 30' E.

South side of gulf.—Rapurapu island, the easternmost island on the south side of Lagonoy gulf, is $9\frac{1}{2}$ miles long east and west and 3 miles wide at the broadest part; it is 1,745 feet high near the centre, and the east and west ends are 500 and 650 feet high respectively. The north-east coast is fringed by a narrow coral reef, dry at low water; discoloured water, with apparently foul ground, extends $2\frac{1}{2}$ miles from this part of the island, and vessels are recommended to give this coast a wide berth. The south coast of the island is described later with Albay gulf.

Ungay point, the south-east point of Rapurapu island and the northern entrance point of Albay gulf, is bold and prominent, rising to a height of 500 feet a short distance from the shore. Several rocks about 20 feet high lie about a cable from the point. The water is very deep off Ungay point, 100 fathoms being found within half a mile of the shore.

LIGHT (Lat. $13^{\circ} 11' N.$, Long. $124^{\circ} 13' E.$).—A white occulting light every ten seconds, the eclipse lasting three seconds, elevated 305 feet above high water and visible 12 miles in clear weather, is exhibited from a white framed structure 53 feet high, erected on Ungay point. For arc of visibility, see Light list and charts.

Rapurapu strait, see page 595.

Chart 2577, Between San Bernardino and Mindoro straits.

Batan island, westward of Rapurapu island, is 11 miles long east and west, about 4 miles wide, 1,509 feet high, and heavily wooded. The north coast, from East point to Kalanaga bay, is clean and bold; westward of this it is bordered by a reef extending one mile in places. Coal of fair quality is found on Batan island.

Kalanaga bay, about 4 miles westward of East point, is a small, well-protected harbour, with anchorage space for one or two vessels. It is about one mile wide at the entrance, extends about the same distance southward, and is surrounded by wooded hills. More than half the bay is occupied by coral reefs, leaving but limited space for anchorage. The surf breaks heavily on the west side of the entrance, marking it distinctly. The edges of the reef on the eastern side are marked by stakes. The coal mines are half a mile up the small stream at the south-west angle of the bay; there was little work being done in 1908.

Directions.—To enter, steer straight in on a South course, giving the stakes on the eastern side a berth of about one cable, and anchoring in 9 or 10 fathoms midway between the fish traps and Sharp point; caution is necessary. Small craft may, with care, run

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}30'E$. up the arm eastward as far as some huts, or may proceed up the bay nearly as far as the house of the manager of the coal mines, which is on the eastern side.

Mount Bilbao (*Lat. $13^{\circ} 16' N.$, Long. $124^{\circ} 1' E.$*), heavily wooded and 994 feet high, is the summit of the peninsula between Kalanaga and Gaba bays; the extremity of the peninsula is Nanlampalai point.

Gaba bay, about 2 miles westward of Kalanaga bay, is one mile wide, and extends 2 miles southward. The reefs that border the shore, with those that lie in the centre of the harbour, reduce the anchorage space considerably, but there is good protected anchorage in 9 fathoms, in a basin $3\frac{1}{2}$ cables in diameter. The entrance is so complicated by reefs that the bay should not be attempted without local knowledge.

The south side of Batan island is described later, with Albay gulf.

Guininyan and **Kagbulauan islands** are two small wooded islands about 250 feet in height, lying northward of the western part of Batan island, and in the northern end of Kakraray pass. They are surrounded by reefs which extend half a mile on the seaward side. Good protected anchorage for small craft may be found south-east of Guininyan island, but local knowledge is necessary, as the entrance is narrow and bordered by reefs.

Kakraray pass, separating Batan and Kakraray islands, is nearly blocked by reefs. Coal harbour in south entrance to this pass, *see* page 596.

Kakraray island, westward of Batan island, is of very irregular outline, heavily wooded, and rises in the centre to a height of 1,250 feet. The north shore is faced by a wide reef. The south side is described with Albay gulf. Kasolgan passage, between Kakraray and San Miguel islands, is nearly dry at low water. There are four small islets in the pass, the southernmost being the largest.

San Miguel island, north-westward from Kakraray island, is $5\frac{1}{2}$ miles long north-west and south-east, and about 2 miles wide at the south-east end. It is about 300 feet high and heavily wooded. The north-east side is very irregular in outline, and is bordered by a reef extending one mile in places. The south-west side is fairly straight and steep-to, and forms the north-east side of Tabako bay.

A shoal of 6 fathoms lies 2 miles northward of Budias point, the eastern extreme of San Miguel island, close to the track usually taken by vessels bound to and from Tabako bay.

San Miguel point, the north-west point of the island, is surrounded by a reef which extends westward three-quarters of a mile, with rocks

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°30' E. awash. A small patch of 4 fathoms lies one mile north-west of the point; the channel between this shoal and those to the north-westward is three-quarters of a mile wide, with a depth of from 10 to 15 fathoms.

Western approach to Tabako bay.—Tiwi point (*Lat. 13° 29' N., Long. 123° 41' E.*), on the coast of Luzon, situated about 6½ miles north-westward of San Miguel point, and 8 miles south-eastward of the eastern entrance point of Atulayan bay, is a rocky headland rising to a height of 438 feet. The shore between Atulayan bay and Tiwi point consists of bold rocky headlands with beaches of sand or gravel in the bights between. There is very little coral reef except near Tiwi point.

Bank.—About 2½ miles south-eastward of Tiwi point is a small sandy cay surrounded by a bank which extends 2½ miles in a south-east direction, and forms the northern side of the channel into Tabako bay. The depth at the south-eastern end of this bank is 1½ fathoms. There is a 15-foot patch at 12 cables west-north-west of the sand cay, and eastward of Tiwi church, leaving a deep channel only 1½ cables in width between it and the shore.

Clearing mark.—Malinao church and lighthouse in line S. 55° W. lead between this bank and the 4-fathoms patch off San Miguel point.

TABAKO BAY lies between the coast of Luzon and San Miguel and Kakraray islands, and is a deep, capacious harbour about 10 miles long and 3 miles wide. The shores on both sides are steep-to, and the bay contains no reefs or shoals except in the entrance and near the head. The bottom is very level with depths of from 50 to 60 fathoms. Pilis bay is a long lagoon extending from the west side of the head of Tabako bay almost to Albay gulf, from which it is separated by a gravel bank about 6 feet high and 20 yards wide; this is used as a portage by native bancas trading between Tabako bay and Albay gulf. Sula channel, at the south-east end of Tabako bay, is a narrow crooked channel between Kakraray island and Luzon. It is about 4 miles in length, and practicable only for small craft. The least water in the channel is 5 feet. The tidal streams meet in the middle of the pass, and run with considerable velocity.

Reef.—About one mile eastward from Bagokay, near the head of the bay, a reef projects one mile north-eastward, surrounding Buguias islet, which is very small, low, and flat-topped. There are several shoals and small islets at the head of the bay beyond the track of ordinary navigation.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ} 30' E$.

LIGHT.—A red fixed light, elevated 36 feet above high water and 24 feet above the ground, and visible 7 miles in clear weather, is exhibited from a white concrete pillar, situated on the ruins of an old fort on the beach in front of the town of Malinao, at the entrance of Tabako bay, about 3 miles north-north-west of the town of Tabako. Kept on a S. 55° W. bearing, it leads between the reefs at the entrance to the bay. For arc of visibility, see Light list.

Tabako (*Lat. $15^{\circ} 22' N.$, Long. $123^{\circ} 44' E.$*).—The town of Tabako lies on the west side of the bay about $3\frac{1}{2}$ miles south-west from San Miguel point. It is of considerable commercial importance, large quantities of hemp being shipped from there. Lighters are available. The population in 1903 was 21,946. Tabako is a telegraph station.

Malilipot and Bagokay are two small towns lying $2\frac{1}{2}$ and $5\frac{1}{2}$ miles respectively, south-eastward from Tabako.

Directions.—Vessels approaching Tabako bay should bring the lighthouse and the church of Malinao in line S. 55° W., before Tiwi point bears anything northward of W.N.W. The church is conspicuous with a galvanised iron roof. Steer in on this line, which will lead $3\frac{1}{2}$ cables from the reefs on either side, until Tabako church bears S. $\frac{1}{2}$ W., when alter course to S. by E. $\frac{1}{4}$ E.; pass close to Baculud point, which is quite bold, and anchor off the wharves at Tabako in 25 or 30 fathoms, sand and mud, about $1\frac{1}{4}$ cables from them.

Tides.—It is high water, full and change, at Tabako, at 6h. 1m.; springs rise $7\frac{1}{4}$ feet.

Chart 3368, South part of Luzon island. Var. $0^{\circ} 40' E$.

ALBAY GULF, bounded on the north by Rapurapu, Batan, and Kakraray islands, and on the west and south by Luzon, is 26 miles long east and west, $6\frac{1}{4}$ miles wide between Rapurapu island and Bingay point in Sorsogon, and about 5 miles in width between Kakraray island and Paron point. The shores are in general steep, and the water deep, with the exception of a number of dangerous reefs lying near the head.

Northern side.—From Ungay point (page 591) westward the south coast of Rapurapu island is clear, with the exception of a large reef lying in front of the town of Rapurapu, and which extends a distance of three-quarters of a mile from the coast for $2\frac{1}{2}$ miles. On its outer edge, abreast the west end of the town, are two large rocks 20 and 30 feet high. There is a small bay affording anchorage behind the eastern end of the reef, the reef itself affording protection from south-west winds, and a small channel leads behind the reef from the

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 30' E.

westward, used by small vessels, and leading to within half a mile of the town.

Babayon point (*Lat. 13° 13' N., Long. 124° 4' E.*), the western extreme of Rapurapu island, is about 100 feet high and well wooded. It is fringed by a narrow reef, but may be rounded at a distance of $1\frac{1}{2}$ cables.

Rapurapu strait, between Rapurapu and Batan islands, is 5 miles long and two-thirds of a mile wide. There is a good channel through the strait, but it is tortuous and complicated by numerous reefs, and must be navigated with caution. It has a least width of a quarter of a mile and a least navigable depth of $5\frac{1}{4}$ fathoms.

Dangers.—Middle reef, lying with its eastern edge $1\frac{1}{2}$ miles S. 13° W. from East point, Batan island, is awash at low water, and breaks heavily in the north-east monsoon. A small shoal spot of $3\frac{1}{2}$ fathoms lies about $2\frac{1}{2}$ cables eastward of the north end of Middle reef; between them is the best channel through.

Derickson reef, covered by one foot of water and always visible, lies one mile south-westward of Middle reef, and a quarter of a mile from the reef fringing the north shore of Rapurapu island. *See* buoys, below.

A small coral shoal, with a depth of $3\frac{3}{4}$ fathoms over it, lies in the southern entrance to Rapurapu strait, at a distance of half a mile to the northward of Babayon point, Rapurapu island.

The shoal is not marked by any discoloration of the water.

Babayon reef, small, and partly dry at low water, lies S. 71° W. one-third of a mile from Babayon point.

Columbia reef, small, and covered by a least depth of 5 feet, lies one mile N. 86° W. from Babayon point. *See* buoys, below.

Beacons and buoys.—Two beacons have been erected on Rapurapu island, about 2 miles north-eastward of Babayon point; the rear beacon is a white diamond, about 13 feet square and 20 feet above the ground, and situated about 100 feet within the coastline.

The front beacon is a white triangle, point upwards, 14 feet above high water, erected on the edge of the reef fronting it.

Both beacons have a black vertical stripe passing through their centres.

These beacons in line S. 5° W. lead through the channel eastward of Middle reef.

A red conical buoy, marked No. 2, lies in 4 fathoms, off the southern edge of Derickson reef.

A red conical buoy, marked No. 4, lies in 4 fathoms on the south-eastern edge of Columbia reef.

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

Batan.—The village of Batan is situated on the south-east coast of Batan island, facing Rapurapu strait. There is a long wooden wharf with sufficient water at the end for lighters; it is connected by a 2 feet gauge railway with the coal mines at the south-east end of the island, belonging to the East Batan Coal Company.

Batan harbour is easy of access, and affords good anchorage; well protected from wind and sea.

Beacons and buoys.—Four beacons and a black spar buoy have been established to mark the unnamed reefs in Batan harbour. The beacons are constructed of concrete. The beacons surmounted by black balls, should be left on the port hand in entering; and those surmounted by red drums, should be left on the starboard hand. The buoy is moored in 3 fathoms, coral bottom, and marks the $1\frac{1}{4}$ -fathom spot off the wharf.

To enter, vessels should pass midway between the port and starboard beacons, and anchor in 7 fathoms of water just eastward of the black spar buoy. Vessels should not attempt to anchor inside the buoy.

Coal.—At present, 40 tons per hour can be loaded into ships.

Directions for Rapurapu strait.—Vessels from the northward should round East point, Batan island, at a distance of half a mile, and steer to bring the leading beacons into line S. 5° W.; follow this mark until Babayon point bears S. 61° W., when it may be steered for, passing close southward of the buoy on Derickson reef. When abreast Derickson reef the red buoy on Columbia reef may be steered for, or the west end of Rapurapu island rounded at a distance of $1\frac{1}{2}$ cables; if the latter course is taken, the vessel, if bound westward, should stand southward for half a mile before hauling westward, to give Babayon and Columbia reefs a good berth. To pass northward through the strait the above directions should be reversed.

Tides.—It is high water, full and change, at Rapurapu, at 5h. 54m.; springs rise about 5 feet.

The south side of Batan island is in general clear and steep-to. About midway on this coast there is a bight extending three-quarters of a mile north-eastward, where anchorage, sheltered from northerly winds, may be found. The head of this bay is filled by a reef, on the western edge of which is a rock 25 feet high. In approaching this anchorage, a small reef lying on the western side of the entrance must be avoided.

Coal harbour (*Lat. 13° 15' N., Long. 123° 55' E.*) forms the southern part of Kakraray channel between Kakraray and

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

Batan islands, the northern portion of which is nearly closed by reefs. The harbour extends for about $1\frac{1}{2}$ miles north of Kakraray point, with a width of 5 to 6 cables between the reefs. A reef extends a quarter of a mile from the shore, a short distance north-westward of Binalbagan point, on the east side of the entrance, and about 2 miles farther north-westward a reef extends half a mile from the Batan shore, with a small rocky islet about 25 feet high in its centre. Between the above-mentioned reefs and a quarter of a mile from the shore are a shoal of $2\frac{1}{2}$ fathoms and a small reef that dries.

Kakraray point is surrounded by a reef extending one-third of a mile eastward, and a detached shoal of $1\frac{1}{2}$ fathoms lies 4 cables N.E. by E. from the point. A depth of 3 feet was found about $1\frac{2}{10}$ miles N. 25° W. from Kakraray point, and a shoal of $2\frac{1}{2}$ fathoms at $1\frac{1}{2}$ miles N. 6° W. from the same point. Deep water may be carried for $1\frac{1}{2}$ miles above these shoals, but the channels are very narrow and intricate.

Coal has been found at the west end of Batan island. The mines here belong to the Government, and are connected by telegraph with Legaspi by a cable laid from Liguan. Coal harbour affords anchorage in 20 to 30 fathoms, mud, with shelter from all winds except south-east.

Vessels should not enter without local knowledge, as the dangers are not marked. Small vessels can find sheltered anchorage in 18 fathoms off the pier in a basin $2\frac{1}{2}$ or 3 cables in diameter, surrounded by reefs.

From Kakraray point the south coast of Kakraray island trends south-westward for $2\frac{1}{2}$ miles to Kabadea point, the eastern entrance point of Port Sula, and is high and well wooded. The coastline is very irregular, being cut into by several bays, fringed with reefs.

Port Sula (*Lat. $13^{\circ} 14'$ N., Long. $123^{\circ} 52'$ E.*), formed by a slight enlargement of the southern part of the narrow channel that separates Kakraray island from Luzon, is well sheltered, and has good holding ground. It is about $2\frac{1}{2}$ cables wide at the mouth, continuing the same width for three-quarters of a mile to the northward. The channel then curves to the westward and narrows to half a cable, so that only the lightest of coasters can enter Tabako bay by it. The entrance points and both sides of the port are bordered by reefs, which reduce the available anchorage space to a width of from one to $1\frac{1}{2}$ cables. The depth at the entrance is 14 fathoms, decreasing gradually to 7 fathoms about three-quarters of a mile from the entrance. A vessel should keep midway between the points when entering. This port affords a good place of refuge for a vessel in Albay gulf caught by bad weather.

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

There is a stream of good water in the north-east part of the port.

Light.—A *red fixed* light, elevated 53 feet above high water, and visible 7 miles in clear weather, is exhibited from a white post, 5 feet high, on Kabadea point, eastern side of entrance to Port Sula.

Libog is a small town situated in the north-west angle of Albay gulf, about $5\frac{1}{2}$ miles westward of Port Sula. It is a telegraph station, and contains a large church, which forms a good landmark. A reef lines the shore near the town, and extends a quarter of a mile off.

Head of Albay gulf.—Landmarks.—Albay (Mayon) volcano, situated about $5\frac{1}{2}$ miles from the shore near Libog, is the most conspicuous landmark in this part of Luzon; it forms a perfect cone 7,943 feet high, and at times gives off a considerable amount of vapour. *See view opposite.*

Mount Linguion, a wooded truncated cone, rises to a height of 555 feet about $1\frac{1}{2}$ miles to the north-westward of Legaspi, and is conspicuous.

Legaspi, situated at the head of the gulf, is the principal port on the east coast of Luzon, and the most important hemp shipping port in the Philippine islands. There are eight small wharves with about 10 feet of water at their ends, but owing to the beach going sheer down into deep water vessels load from them over the stern in fine weather. *See view d*, at page 536.

LIGHT (*Lat. 13° 10' N., Long. 123° 45' E.*).—A *red fixed* light, elevated 59 feet above high water, and visible in clear weather from a distance of 9 miles, is shown from a white-framed structure 51 feet high, situated to the northward of the town.

The anchorage off Legaspi is in from 17 to 22 fathoms, about $1\frac{1}{2}$ cables from the shore, but on account of the irregularity of the bottom, which consists of volcanic sand, rocks and mud, it affords poor holding ground. The anchorage is open to the eastward, and the north-east monsoon frequently sends in a heavy sea.

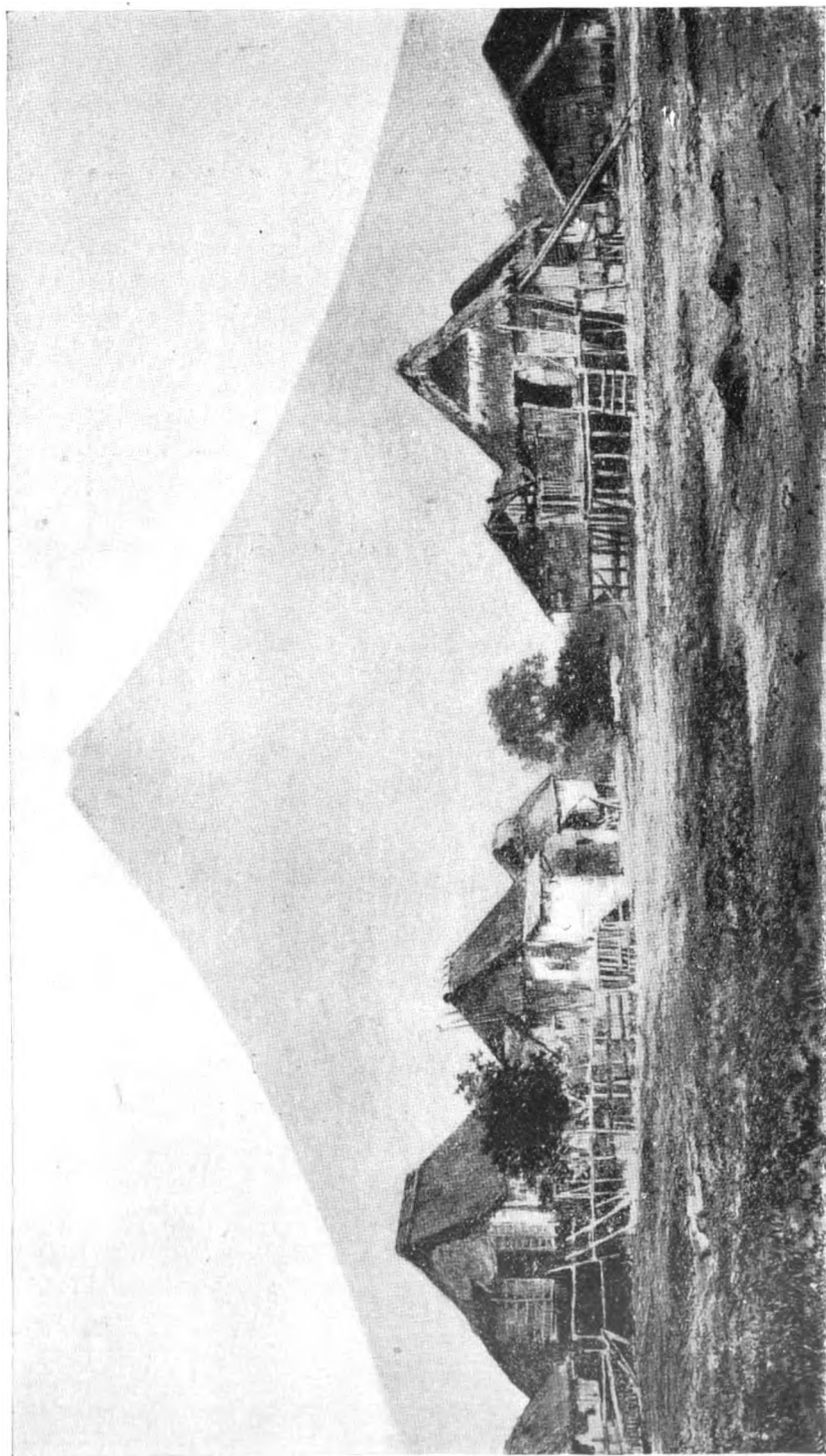
Telegraph.—Legaspi is a telegraph station; the cable from **Bakon** is landed here; there is also a cable to Liguan in Batan island to communicate with the coal mines there.

Tides.—It is high water, full and change, at Legaspi, at 5h. 57m.; springs rise $7\frac{1}{2}$ feet.

Albay, the capital of the province, is about $1\frac{1}{2}$ miles to the westward of Legaspi. Albay is a telegraph station.

Kapuntukan point, half a mile to the south-eastward of Legaspi, is a steep hill, 222 feet high, covered with grass.

General charts 2577, 943, 1263.



Albay (Mayon) Volcano, Luzon.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

The Sabang river discharges immediately northward of the point.

Dangers.—Buoys.—The following reefs lie off Legaspi:—

Katubeg reef, with a depth of $1\frac{1}{2}$ fathoms, is situated $3\frac{1}{2}$ miles N. 48° E. from Kapuntukan point; it is marked on its northern side by a black can buoy, No. 1, moored in $4\frac{1}{2}$ fathoms.

Barao reef, one-third of a mile to the south-westward of Katubeg reef, has a least depth of 5 feet.

Denson reef, with a least depth of 5 feet, is situated $2\frac{1}{2}$ miles N. 67° E. from Kapuntukan point; it is marked on its southern edge by a red conical buoy, No. 2, moored in 5 fathoms.

Poliki reef, with a least depth of $2\frac{3}{4}$ fathoms, is situated $3\frac{1}{4}$ miles S. 88° E. from Kapuntukan point.

Legaspi reef, with a depth of $2\frac{1}{2}$ fathoms, is situated one mile N. 83° E. from Kapuntukan point.

A small reef, with rocks awash at low water, lies about $1\frac{1}{4}$ miles N. 13° E. from Legaspi light, and a quarter of a mile off-shore.

Directions.—Vessels bound to Legaspi usually skirt the north shore of the gulf at a distance of at least one mile until the town of Legaspi bears S. 30° W., when it is steered for. Or, the anchorage may be approached directly by passing between Barao and Denson reefs, the channel between which is one mile wide and very deep. By day, Daraga church, which is very conspicuous, bearing S. 76° W., just open northward of Legaspi lighthouse, is a good mark for this channel. At night, Legaspi light, bearing S. 75° W., leads midway between the reefs.

Southern side of gulf.—Bingay point (*Lat. $13^{\circ} 4'$ N., Long. $124^{\circ} 11'$ E.*), the southern entrance point of the gulf, is fronted by a reef which extends a quarter of a mile to the northward and $1\frac{1}{2}$ miles to the eastward. Bingay islet, 4 cables to the eastward of the point, is 15 feet high; the reef extends $1\frac{1}{2}$ cables northward of the islet.

Coast.—From Bingay point to Sugot bay the shore is fringed by a reef about half a mile wide in places.

Sugot bay is about 3 miles wide and the same deep. Its shores are fringed with reefs, narrow on the eastern side, and about half a mile wide on its southern and western sides. The depths are from 10 to 40 fathoms, and anchorage may be found at the southern part of the bay about a mile from the head in from 12 to 15 fathoms, mud, but a shoal with a quarter of a fathom on it, charted about three-quarters of a mile W. by S. $\frac{1}{2}$ S. from Esteban village must be avoided.

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

Bakon is a small town about a mile west of Sugot bay; there is a break in the shore reef abreast it, enabling the shore to be approached in boats.

In the town is a church with a dome and about a mile westward there is a hill 360 feet high near the beach, both of which are good landmarks.

The country between Bakon and Sorsogon bay is flat and low, forming a break in the mountains, through which there is a good road.

Anchorage.—The anchorage off Bakon is bad, being exposed to north-east and east winds and seas. Vessels usually anchor off the town outside the line of reefs in from 12 to 15 fathoms, mud and sand, taking care to avoid the telegraph cable. Small vessels may anchor farther in in 5 fathoms, sand, but the holding ground is indifferent, with the church bearing South and the hill westward of the town S. 74° W.; half a cable inside this position is a small rock nearly awash.

Telegraph.—Bakon is a telegraph station. The cable from Legaspi lands here, and its position is marked by a cable buoy.

The coast from Sugot bay to Kait point has a narrow fringing reef, outside which there are apparently no dangers.

Gajo point (*Lat. 13° 7' N., Long. 123° 58' E.*) is clean, steep-to and projecting, being the termination of a mountain mass, which rises to a height of 3,606 feet at 3¾ miles southward. From Gajo point the coast trends westward 3¾ miles; here there is a hot spring near the shore, the vapour from which can be seen some distance. Thence the coast trends northward 1¼ miles to Paron point, and then westward for 2½ miles to Kait point.

Kait point, the eastern entrance point of Poliki bay, is low, covered with mangroves, and fringed by a reef to a distance of half a mile.

Manito reef, with a least depth of 2 fathoms, is situated with its northern end about a mile N. 61° W. from Kait point. There is another reef awash at low water nearly half a mile southward of Manito reef.

Poliki bay, in the south-west corner of the gulf, is about 5 miles wide at the entrance between Kait and Luvas points, and extends about the same distance southward. The shores of the main bay are fringed with reefs, which are comparatively narrow on the eastern side. The smaller bays are nearly filled with reefs.

The centre of the bay is deep and clear of dangers, with the excep-

General charts 2577, 943, 1263.

Chart 3368, South part of Luzon island. Var. 0° 40' E.

tion of a shoal with a depth of $5\frac{1}{2}$ fathoms, situated $1\frac{1}{4}$ miles S. 73° E. from Luvas point.

Coast.—From Bingay point the coast trends nearly 3 miles southward to Montufar point, and then south-westward for $6\frac{1}{2}$ miles to Port Gubat, and is fronted by a wide reef with a break in it between Montufar point and Gubat. The reef is widest at about 3 miles south-west of Montufar point, where it extends over 2 miles; its outer edge is always well defined by heavy breakers, which may be approached to a distance of a quarter of a mile, as the water is deep close up to them.

Plan of Port Gubat on 3475.

Port Gubat (*Lat. $12^{\circ} 55' N.$, Long. $124^{\circ} 8' E.$*), about 10 miles south-westward of Bingay point is formed by an opening in the reef which extends along this coast, and is from a half to one mile wide. The port consists of two bights divided by a reef extending half a mile from Penuntignan point. The southern one is the larger, and has depths of from 5 to 8 fathoms, but it is exposed, and the holding ground is poor; shoals are charted within the 5-fathoms line, which lies 6 cables from the head.

The northern bight, about 2 cables wide between the reefs, has depths of from 3 to 6 fathoms, and is suitable for small craft. The reefs on either side are bare at low water, and shelter the bay from the sea.

A rocky shoal with a least depth of 3 fathoms lies in the approach to the northern bight, nearly 2 cables southward of Kanauay reef and one mile S. 80° E. from Gubat church.

Anchorage.—The best anchorage in the northern bight is in from 5 to 6 fathoms, about 2 cables northward from the point of the reef extending from Penuntignan point.

Directions.—To enter the northern harbour, bring a pyramidal rock on the reef extending from the west shore in line with the white gate of the cemetery, bearing N. 63° W., which leads to the anchorage. It is reported that these marks are difficult to make out, owing to the rock being partially washed away and the cemetery gate nearly obscured by trees. If they cannot be distinguished, a large white iron warehouse on the north side of the town kept on a N. 69° W. bearing will lead in. Both these courses lead over the 3-fathoms shoal previously mentioned, but it may be avoided by steering half a point more to the westward until the western entrance point of the Sabang river bears N. by W. $\frac{3}{4}$ W., when the vessel should be hauled northward on to the mark, to give the reef extend-

General charts 3368, 2577, 943, 1263.

Plan of Port Gubat on 3475. Var. $0^{\circ} 40'$ E.

ing eastward from Penuntignan point a good berth. There are no aids to navigation, but the reefs can generally be seen.

Gubat.—There are two landing places. A road leads to Bakon and Sorsogon. Merchant steamers touch at this port frequently. No supplies are obtainable.

Tides.—It is high water, full and change, at Port Gubat, at 5h. 51m.; springs rise $4\frac{1}{2}$ feet.

Chart 3368, South part of Luzon island.

Coast.—From Rasa point, the southern entrance point of Port Gubat, the coast trends southward for $18\frac{1}{2}$ miles to Padang point, the northern entrance point of Matnog bay. The coast reef in the northern part of this stretch is about half a mile wide, except off Barcelona, $1\frac{1}{2}$ miles south of Rasa point, where its width is one mile; farther southward it narrows gradually to a mere fringe; there are several breaks in the reef.

Bulusan (*Lat. $12^{\circ} 45'$ N., Long. $124^{\circ} 8'$ E.*).—The town of Bulusan, 10 miles southward of Gubat, lies on the parallel of San Bernardino islet light. Anchorage may be found here off a break in the reef in from 12 to 14 fathoms, with the church bearing N.W. by W. $\frac{1}{4}$ W. and Tang point N. $\frac{3}{4}$ E.; the holding ground is not very good, and a considerable current is felt.

There are several unimportant towns on this part of the coast, but vessels generally call at Gubat and Matnog only, to which places the other towns send their products for shipment.

Bulusan volcano, distant 5 miles from the coast, and nearly west of Bulusan town, is an active volcano 5,115 feet in height. When not obscured by clouds it forms an excellent mark for making this coast, as it is visible over 60 miles.

Sharp peak, about one mile north-east of the volcano, is 3,986 feet in height; it appears sharp when seen from the eastward, but not from other directions.

Chart 3370, San Bernardino strait and approaches.

Balusingan bay is formed by a curve in the coast between Pakahan and Padang points, northward of Matnog bay. It affords anchorage in from 10 to 15 fathoms, sand, from half to three-quarters of a mile off-shore, protected from westerly and south-westerly winds. In the centre of the bay at three-quarters of a mile from the shore the depths are 7 to 9 fathoms.

Charts 3368, 3370.

San Bernardino islets lie nearly 9 miles eastward of the church at Bulusan. The southern and larger islet, on which the light is situated, is about 4 cables long north and south and $1\frac{1}{2}$ cables broad; it is thinly wooded, and rises in the centre to a height of about

General charts 3368, 2577, 943, 1263.

Charts 3368, 3370. Var. 0° 40' E.

170 feet. There are two large rocks about 10 feet high, 2 cables eastward of the southern islet, with foul ground between.

The northern islet, about $1\frac{1}{2}$ cables long and 100 feet high, is very rugged and bare of vegetation; it is less than a cable from the southern islet.

These islets are situated on the south-western end of a bank having depths of from 10 to 20 fathoms, and extending 6 miles north-eastward, surrounded by much deeper water. There are tide rips on this bank $1\frac{1}{2}$ miles northward of the islets.

The channels between the islets and Luzon to the west, and Biri island to the south-east, $7\frac{1}{2}$ and 5 miles wide, respectively, are clear and deep.

LIGHT (*Lat. 12° 45' N., Long. 124° 17' E.*).—From a white conical tower on the summit of the southern San Bernardino islet an *alternating flashing light every fifteen seconds* is exhibited, showing one *red* and one *white flash* alternately with an interval of *fifteen seconds* between them; the light is elevated 215 feet above high water, 48 feet above the ground, and is visible 20 miles in clear weather.

Chart 3368, San Bernardino strait and approaches.

SAN BERNARDINO STRAIT has been described in Chapter VIII.

Directions.—Sailing vessels steering for San Bernardino strait from the eastward generally make the bold high land of Cape Espiritu Santo, at the north-east extremity of Samar, which is proper with an easterly or southerly wind; but if the wind be northerly it seems advisable to steer direct for the strait, as the north coast of Samar is with that wind, a lee-shore for 60 miles before reaching the strait. From Espiritu Santo to the entrance of the strait the coast is bordered all along with islets, shoals, and reefs.

General charts 2577, 943, 1263.

CHAPTER X.

EASTERN COAST OF THE PHILIPPINE ISLANDS; EAST AND SOUTH COASTS OF SAMAR; EAST COAST OF LEITE AND EAST COAST OF MINDANAO.

VARIATION IN 1911.—Increasing about one minute annually.

Plan of Port Palapag and Laoang bay on 2395. Var. 0° 50' E.

N.E. COAST of SAMAR.—Laoang (Laguan) bay, between Livas point and the western side of Laoang island, is about 2 miles wide, and extends 3 miles south-eastward. The depths decrease regularly from 10 fathoms at the entrance to 2 fathoms about a mile from the head. In ordinary weather it offers good anchorage in 2 to 5 fathoms, sheltered from all winds except those between north and west; or farther out in deeper water. The south-eastern part of the bay is rocky.

Buoy.—A black conical buoy is moored, in $2\frac{1}{2}$ fathoms, about $1\frac{1}{2}$ miles S. 88° W. from Laoang church, to mark the turning point for entering the channel to Laoang harbour.

Laoang island (*Lat. $12^{\circ} 35' N.$, Long. $125^{\circ} 1' E.$*) is separated from the coast of Samar by a narrow channel which communicates with Port Palapag. It is about $6\frac{1}{2}$ miles long north-west and south-east, and 2 miles wide at the south-eastern end. It is heavily wooded, and rises in the southern part to a height of 214 feet. The western side is fringed with reef, with shoal water outside it, extending 3 and 5 cables from the shore in places.

Dernasan island, lying between Laoang island and Samar, is a low wooded island formed by the delta of the Katubig river.

Laoang channel, between Laoang and Dernasan islands, is impassable except by bancas at high water; it is dry at low water.

Katubig river.—The main branch of the Katubig river discharges into Laoang bay, widening near the mouth, and forming Laoang harbour. The eastern branch, known as Palapag channel, discharges into Port Palapag. At high water, small launches may pass from Laoang to Port Palapag by ascending the Katubig river and passing through the Palapag channel. The Katubig river has $1\frac{1}{4}$ fathoms at the entrance at low water and 2 fathoms inside, and is

General charts 2577, 943, 1263.

Plan of Port Palapag and Laoung bay on 2395. Var. 0° 50' E.
navigable by small steamers drawing 10 feet as high as Katubig, a distance of 10 miles inland.

Laoang harbour is narrow, being only 150 yards wide between the 2-fathoms curves. Rocky patches extend about 6 cables westward from Makulmakul point, and form the northern side of the channel into the harbour. About 350 yards south-westward of the same point is the wreck of an iron steamer, nearly submerged at high water, and marked by a beacon, consisting of a post, surmounted by a white triangular topmark. Shoal water extends $4\frac{1}{2}$ cables westward from the south entrance point, and within, on the north side, inside the line of the end of the wharf, are rocky reefs. There is a light wharf, 120 yards long, with 9 feet of water at the end, extending from the eastern part of the town; small steamers can berth alongside it with difficulty. It is stated that at high water vessels drawing 14 or 15 feet may enter the harbour, but are obliged to moor off the wharf, as the swinging room is very limited. For tides *see* Port Palapag, at page 607.

Directions.—Vessels bound for Laoang should stand up the middle of the bay, and as soon as the buoy is sighted, steer for it; round the buoy close-to on the port hand, and steer for the beacon on the wreck on a N. 67° E. bearing, passing close southward of it, and steer for the wharf a little open on the port bow, and anchor about half a cable from the end of the wharf in $2\frac{1}{4}$ fathoms at low water, as charted.

Laoang.—The town of Laoang stands on a slight eminence on the south-west shore of Laoang island. It is the principal port of northern Samar, and a considerable amount of hemp and copra are exported. Population, 8,800 in 1902.

Kahayagan island is about $1\frac{1}{4}$ miles in extent, moderately high and heavily wooded. It is situated northward of Laoang island, with a narrow channel between, in which the depth is $3\frac{3}{4}$ fathoms. It is surrounded by a reef, narrow on the east and south sides, and widening out on the north and north-west sides. The reef from the north-west part extends about one mile and surrounds Makan islets, which are rocky and partly covered with brush; the two highest rise to a height of 18 and 21 feet, respectively.

Batag island, the largest and most eastern of the islands forming Port Palapag, is about 5 miles long north and south, and very irregular in shape. It is surrounded by reefs, which, from the north-west part of the island, extend over half a mile westward into the north entrance channel to Port Palapag.

Batag is heavily wooded, and rises to a height of 220 feet.

LIGHT (Lat. $12^{\circ} 40' N.$, Long. $125^{\circ} 4' E.$).—A white group flashing light, showing three flashes every ten seconds, eclipse between
General charts 2577, 943, 1263.

Plan of Port Palapag and Laoang bay on 2395. Var. 0° 50' E.

flashes *two seconds*, and between groups *six seconds*, visible 25 miles in clear weather, is exhibited, at an elevation of 318 feet above high water, from a cylindrical concrete tower, 101 feet high, on the summit of Batag island. The dome of the lantern is white, and the lower part red. Dwelling-houses are situated close southward of the light-house.

PORT PALAPAG (*Lat. 12° 38' N., Long. 125° 1' E.*), formed by the channel that separates the islands Laoang and Kahayagan from Batag island, is about 7 miles long and one mile wide; part of it is sheltered from all winds, and it affords good anchorage in from 5 to 9 fathoms, bottom sand and mud. The reefs and shoals that fringe the shores are steep-to. The northern entrance is $6\frac{1}{2}$ cables wide and 12 to 24 fathoms deep between the reefs on either side; the eastern entrance is $7\frac{1}{2}$ cables wide in the entrance, with rocky patches within. The channel between Laoang and Kahayagan island is too narrow to be navigable by vessels of any size, and the tide runs through it with considerable velocity.

Within the port, on the coast of Batag, there is an open bay nearly blocked by reefs, eastward of Leung point bearing N. 1° E. Kalapan islet, on the south-west side of the port, is surrounded by rocks, and from this islet the Laoang shore is bordered by reefs as far as Napakol point. South of Batag island are several coral patches, with very little water on them. From the southern entrance point of the eastern channel a reef extends 4 cables northward and eastward.

In the channel between Batag island and Laoang island there is a shoal, with a depth of $2\frac{1}{2}$ fathoms, lying one mile S. 47° E. from the south-east point of Kahayagan island, and about $1\frac{1}{2}$ cables farther southward is a patch of $4\frac{3}{4}$ fathoms.

Good water can be obtained from Laoang island.

Anchorage.—Good anchorage for moderate sized vessels may be found westward of the south-east point of Kahayagan, in 5 fathoms, mud; or south-eastward of Leung point, Batag island, in 6 fathoms. Large vessels should anchor about half a mile south-eastward of Kahayagan, in 8 fathoms, or farther southward off the south-west point of Batag, taking care to avoid the patch of $2\frac{1}{2}$ fathoms previously mentioned.

Directions.—Vessels entering from the northward should favour the western side of the channel, as the reefs from Kahayagan do not extend as far out as those from Batag. The south-east point of Kahayagan and Leung point, Batag, are bold to within half a cable, and may be rounded fairly close, and anchorage taken up as previously recommended.

General charts 2577, 943, 1263.

Plan of Port Palapag and Laoang bay on 2395. Var. 0° 50' E.

Vessels entering from the westward, between Laoang and Kahayagan islands, should favour the Laoang side until the south-east point of Kahayagan bears N. 83° E., when it may be steered for, and anchorage taken up with the point on that bearing, distant a quarter of a mile, in 5 fathoms.

The eastern entrance, in the absence of any aids to navigation, should not be attempted by a stranger.

Tides.—In Port Palapag it is high water, full and change, at 6h. 40m. ; springs rise 6 feet.

Bakan island, $2\frac{1}{2}$ miles east of the eastern entrance to Port Palapag, is nearly one mile long north and south, and is generally low and wooded, except near the centre, where a grassy hill top with a few scattered trees on it rises to a height of 170 feet. It is fringed by reefs to a distance of half a mile.

About three-quarters of a mile north-westward of the north end of Bakan is a shoal patch of $2\frac{1}{4}$ fathoms; at 2 miles northward and $1\frac{1}{4}$ miles north-eastward are rocky patches covered by 4 and 5 fathoms respectively.

Bakan island is separated from the coast of Samar by a channel one cable wide.

Chart 2577, Between San Bernardino and Mindoro straits.

Banks.—About 2 miles eastward from the north end of Bakan island and 3 miles eastward of the south end of the same, are banks on which the depths are 6 and 8 fathoms respectively.

EAST COAST of SAMAR.—From Bakan island the coast trends south-eastward 11 miles to Manhud point, and is generally fringed with reef, and may be approached to a distance of one mile.

Cape Espiritu Santo (*Lat. 12° 33' N., Long. 125° 11' E.*), near the north-eastern extremity of Samar, is formed of high land scarped and steep, visible in clear weather at a distance of 40 miles, serving as an excellent mark for working the strait of San Bernardino, though it forms no projection from the general shore-line. Its highest point is about $4\frac{1}{2}$ miles south-eastward of Bakan island and nearly half a mile from the shore, and it is densely wooded to the water's edge. From off-shore are seen two summits of nearly equal height, the higher, 1,480 feet, being the southern.

Mount Palapag, 1,219 feet high, which rises 5 miles south-south-west of Cape Espiritu Santo, is visible from off the north coast of Samar, but is prominent more from its shape, which is flat-topped, than from its height. Off the coast between Batag island and Gumay bay it is not visible.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$.

At 5 miles south-eastward of Bakan island, close in-shore and under the cliffs, and connected with them at low water, lies the first high pyramidal rock of the many which give distinctive character to the coast hence to Manhud point, and which rise to heights of from 10 to 184 feet. When close in-shore at either end of this stretch of coast, these rocks present an imposing appearance. Most of them lie a little way from the beach, and their sea faces are worn into fantastic shapes by the waves.

Dapdap bay is an indentation abreast a small valley $5\frac{1}{2}$ miles north-west of Manhud point; it is half a mile in extent, fringed with reefs, and has depths of 9 to 10 fathoms, but affords no suitable anchorage.

Facing Dapdap bay are three outlying rocks lying in a north-west and opposite direction and 4 to 5 cables apart. Cube rock, the south-eastern of these, is 27 feet high, and lies on the edge of the shore reef at 4 cables north-east of the southern entrance point to Dapdap bay; it is steep to on its seaward side, and the other rocks are surrounded by deep water.

Mapanas bay, $1\frac{1}{2}$ miles north-west of Manhud point, is one-third of a mile wide at the entrance, and extends about one mile south-westward. It is much contracted by reefs from each side, which leave a very narrow channel to the head of the bay, where it is wider, and where small craft can find shelter in $6\frac{1}{2}$ fathoms. At the head of the bay is a village, also a sand beach, through which two small streams flow.

Manhud point (*Lat. $12^{\circ}28'N.$, Long. $125^{\circ}18'E.$*) is formed by a spur running north-eastward from the interior mountain chain. The extreme point has a perpendicular face over 50 feet high, with deep water close to. A short distance north-westward of the point are some high rocks, and from a point lying about $6\frac{1}{2}$ cables south-south-eastward of Manhud point, some low rocks stretch out eastward half a mile, with a rock awash at the end and a sunken rock northward of it.

Sakamalig bay lies between Manhud point and Sila point, $4\frac{1}{2}$ miles south-eastward. Two moderately high rocks lie in the northern part of the bay, about 3 cables from the shore. The northern and southern sides of the bay are fringed with reefs, the centre part has a sandy beach, off which anchorage may be had in 10 to 15 fathoms, sand, half a mile or more from the shore.

Sila point, which separates Sakamalig and Gumay bays, appears like three pyramidal hills when seen from north-west or south-east. The hills are 195, 322, and 554 feet in height, the lowest being the easternmost and the highest the westernmost. Northward of the point

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E. on the fringing reef, which is a quarter of a mile wide, are several needle-shaped rocks, and other rocks extend a quarter of a mile eastward of the point.

Clearing mark.—Sora cay open eastward of Higunum rock leads eastward of all dangers off Manhud and Sila points.

GUMAY BAY.—Between Sila point and Hiuinatungan island, about 8 miles south-eastward, the coast recedes about 5 miles south-westward, forming Gumay bay, which is full of coral reefs and dangerous to navigate, even with the aid of a chart. The shores of the bay are indented by several smaller bays, the dividing points of which are surrounded by reefs dry at low water. Many sunken reefs, with from one to 2 fathoms over them, which do not break in ordinary weather, constitute the dangers to a stranger in these waters.

Higunum rock, lying $1\frac{1}{2}$ miles S.E. by E. from Sila point, is a flat rock about 26 feet high, over which the sea breaks in heavy weather. It is steep-to on all sides.

Sora cay, $3\frac{1}{2}$ miles south-eastward of Sila point, is a low sandy islet which changes its shape with every gale. It lies near the eastern end of a reef about 3 miles in length west-north-west and east-south-east. Vessels passing east of Sora cay should give it a berth of at least one mile. In 1908, a wreck on the cay formed a good landmark.

At a distance of 4 miles S. 18° W. from Sila point is an unnamed sand cay just above high water; it is surrounded by a reef, dry at low water.

Kanabayon island is a low, wooded island with a sand beach, lying South $4\frac{1}{2}$ miles from Sila point. It is surrounded by a reef, except on the south side, and is the only island of its kind in the bay.

Gumay (*Lat. $12^{\circ} 23'$ N., Long. $125^{\circ} 18'$ E.*).—The village of Gumay lies at the mouth of the river of the same name about $2\frac{1}{2}$ miles south-westward of Sila point. Good anchorage may be found off Gumay during the south-west monsoon, but with a swell from the eastward it is not safe.

Directions.—To reach Gumay, vessels should pass on either side of Higunum rock, and when the unnamed sand cay above mentioned bears S. 30° W. steer for it until a large arch rock, one of a line of rocks projecting south-eastward from the northern entrance to Gumay river is abeam, when alter course to West and anchor in 8 fathoms, mud, with the southern entrance point of the river bearing N. 26° W., distant nearly three-quarters of a mile. Small vessels may anchor nearer the river entrance.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$.

Kagamotan, Saonlok, and Lapinig bays lie southward from Gumay in the order named. They are open to the eastward, and afford no protection from wind and sea from that direction. The depths in Saonlok bay are 4 to 7 fathoms, and in Lapinig bay from 4 to 8 fathoms.

Helm harbour (*Lat. $12^{\circ} 18' N.$, Long. $125^{\circ} 21' E.$*), the largest indentation in Gumay bay, is separated from Lapinig bay by Barabod point, a low mangrove-covered point, with scattered trees near its extremity. It extends south-westward in a winding direction for 4 miles, with depths of from one to 8 fathoms, but only a small part of it, about $1\frac{1}{2}$ miles from the entrance, is available for anchorage. It affords good anchorage for moderate-sized vessels, perfectly protected from all wind and sea. This harbour should be entered by a stranger for the first time at low water or when it is so rough that all the shoals in Gumay bay are breaking.

Directions.—For a vessel seeking shelter from a threatening typhoon, the following directions may be of use:—

When from 2 to 3 miles southward of Sora cay bring Barabod point to bear N. 86° W. and steer for it on that bearing. This course leads between the reef extending northward from the eastern entrance point, and a sunken reef with a least depth of 5 feet on it, a quarter of a mile northward. When the eastern entrance point is abeam, haul gradually southward with caution, as the entrance channel is only a quarter of a mile wide, and steer S. by E. for a brown landslide on a conspicuous bluff on the south side of the harbour, anchoring when a depth of 4 fathoms is obtained. Should Barabod point not be made out, the edge of the shore reef may be followed on the port hand at a distance of a quarter of a mile, and round the edge of it closely, then endeavour to follow the previous directions.

Helm harbour may be approached from the northward by bringing the east side of Kanabayon island to bear S. 1° E., and steering for it until within half a mile of it, then haul eastward and bring Sila point to bear N. by W., astern, keeping a good lookout for a 3-foot patch lying nearly a mile south-east of Kanabayon island; pass eastward of the reef off the entrance to Helm harbour, and follow the previous directions.

Nabugtusan island, forming the eastern side of Helm harbour, is moderately high, but the part which forms the eastern entrance to the harbour is low and covered with mangroves. At high water there is a boat channel between Helm harbour and San Ramon bay, making Nabugtusan an island. Binarayan island lies eastward

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E. of Nabugtusan, separated from it at high water by a narrow boat channel. Both these islands are bordered on the north and east sides by a broad reef which dries before low water, and makes a good guide for Helm harbour and San Ramon bay.

San Ramon bay (*Lat. 12° 17' N., Long. 125° 23' E.*).—The entrance to this bay is between Binarayan island on the west and Hiuinatungan island on the east side. It extends over 2 miles south-south-west and about half-way in a branch runs west-north-west which forms a large bay at high water, but at low water is nearly filled with dry reefs. In the northern part of this branch, there is a contracted but absolutely safe typhoon anchorage for small vessels, considered by some to be as good as Helm harbour and much easier of access. The depths in San Ramon bay are from 4 to 15 fathoms.

Hiuinatungan island, on the eastern side of the entrance, is low, covered with mangroves, and difficult to make out from seaward; a reef extends three-quarters of a mile north-eastward from it.

The small village of San Ramon lies on the western shore of the bay.

Directions.—To enter San Ramon bay, pass about 3 cables eastward of Binarayan island on a S.S.W. course, looking out for the reefs on either side, and anchor in about 5 fathoms, mud, when the first low point westward is abeam. To enter the typhoon shelter south-west of Binarayan island, round the south end of that island at a distance of 2 cables and steer north-westward, going slowly, and keeping a lookout for the points of two long reefs extending from the south-west shore of this branch, and anchor in about 4 fathoms, mud, about 150 yards from the mangroves to the north-east and a cable from the bushes to the north-west. Vessels should moor with the starboard anchor to the northward.

Coast.—From Hiuinatungan island the coast trends south-eastward for about 8 miles, then south $1\frac{1}{4}$ miles to Bunga point. The shore is lined with mangroves, but a short distance within them the land rises to a level wooded ridge. The coast is fronted by a broad reef, dry at low water, with deep water close to its outer edge. It is $1\frac{1}{2}$ miles wide at the north-west end, narrowing to three-quarters of a mile at the south-east; it can be approached to within half a mile, and the edge is always marked by breakers. There are four breaks in the reef, leading to small bays and streams, but they are exposed and of no value to navigation.

Bunga point is low, and covered with mangroves, but rises northward to a ridge 50 feet high, and covered with trees. The point $1\frac{1}{4}$ miles northward of Bunga point is easily identified by a group

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E. of gigantic boulders lying on the reef three-quarters of a mile eastward of the point. They make a conspicuous landmark for vessels approaching from north-west or south-east by reason of their jagged outlines and apparently long distance from the shore when first raised above the horizon.

Apiton island (*Lat. 12° 10' N., Long. 125° 32' E.*), lying three-quarters of a mile south-eastward of Bunga point, is 113 feet high at its south-east end, and slopes gradually to the north-west. It is densely wooded, mostly with cocoanut trees, and is surrounded by a reef, on which, eastward and southward of the island are many large rocks. Off the south-east point of the island is a conspicuous rock, 63 feet high, and steep-to on its southern side. Between the reef surrounding the island and Bunga point there is a narrow boat channel.

Anchorage, protected from easterly winds and seas may be found in 10 fathoms, mud, off the western side of Apiton island.

Off-lying islands.—A group of islands, consisting of Tubabao, Hilaban, Sibay, Fulin, and several smaller ones, lie in a north and south direction on the western edge of a reef beginning about $2\frac{1}{2}$ miles S. 31° E. from Apiton island, and extending nearly 8 miles southward. The reef is narrow at the northern end, and gradually widens until at the southern end it extends over a mile eastward and south-eastward of Fulin, the southern island of this group.

Channel.—The channel between the 63-foot rock off Apiton island and the pyramidal rock off the north end of Tubabao island, is $2\frac{1}{2}$ miles wide, deep, and free from danger, with the exception of a small coral shoal, on which the least depth is $3\frac{1}{4}$ fathoms, lying about $1\frac{1}{4}$ miles south-eastward from Apiton island. The sea breaks heavily on this shoal in bad weather. Westward of the long reef on which Tubabao island is situated is a smooth, deep passage, $2\frac{1}{2}$ miles wide at the narrowest part.

Tubabao island, the northernmost of the group just mentioned, is nearly 2 miles long north-west and south-east, and 106 feet high; it is entirely covered with cocoanut trees. A pyramidal rock 30 feet high lies off the north-west point connected with the island by a reef dry at low water. A good-sized village is situated on the western side of the island.

Hilaban.—The next large island southward of Tubabao is over 2 miles long, narrow, and slightly curved, with the concave side to the west; it is low, and covered with cocoanut trees, the tops of which are 55 feet high. At the southern end is a large village, to which a narrow opening in the reef gives

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E. access and good shelter for small craft. Three small islets, the highest of which is 42 feet, lie between Tubabao and Hilaban, and another, three-quarters of a mile long and 50 feet high, lies eastward of the north end of the latter island.

Sibay and Fulin, with two islets between them, are small, and covered with cocoanut trees; they lie southward of Hilaban, and appear as one island on all bearings except East and West.

Anchorage.—The best anchorage in this vicinity during the north-east monsoon is off the middle of the west side of Hilaban in about 10 fathoms, mud. Good anchorage may also be found off the west side of Tubabao, but in deeper water, as the bank is steeper.

Pasig islet (*Lat. 11° 58' N., Long. 125° 32' E.*) is a small sand cay, about 6 feet high, with a few bushes on it, lying about 3 miles south-south-west from Fulin island. The cay stands on the western side of a reef over one mile in diameter, the greater part of which is dry at low water, but on it are a number of scattered boulders that never cover. A shoal of $2\frac{1}{2}$ fathoms extends north-eastward from the reef, and the channel between this shoal and the reef extending from Fulin island is nearly $1\frac{1}{2}$ miles wide, and deep, with the exception of a small shoal of $6\frac{1}{2}$ fathoms near the middle.

Coast.—From Bunga point the coast trends in a general south-west direction for $5\frac{1}{2}$ miles to the head of Oras bay, and thence south-eastward for $5\frac{1}{2}$ miles to Cabra point, which lies $6\frac{3}{4}$ miles southward from Bunga point. This large bay is indented by several smaller bays separated by low points covered with mangroves and fringed with reefs; there are many detached sunken reefs, some of which lie a mile from the nearest shore. Behind the mangroves are cocoanut trees, and the high land is covered with dense forest. Oras bay is the only one of any commercial importance, and Baktol bay alone affords perfectly sheltered anchorage.

San Policarpo bay, between Bunga and Binugayan points, is three-quarters of a mile wide at the entrance, and extends about one mile northward, with depths of from 2 to 5 fathoms. The shores are fringed by reefs, and there are many sunken coral heads throughout it. A reef with one fathom of water on it half a mile south-east of the west entrance point obstructs the entrance, and at the same time protects the bay from heavy seas. The best entrance channel is westward of this reef, and the best anchorage is in the middle of the bay, in about 5 fathoms, mud, with the eastern entrance point in line with the north end of Apiton island.

Binugayan bay, with 3 to 5 fathoms, and Lipusan bay, with 2 to 5 fathoms, lie between Binugayan point and Ludo point, $1\frac{3}{4}$ miles

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. south-westward; both bays are foul. A line of sunken reefs extends south-eastward from the point separating the two bays; the outer reef, with $2\frac{1}{2}$ fathoms on it, lies W. by S. $2\frac{1}{4}$ miles from the large rock at the south end of Apiton island. Vessels in this vicinity should give the outlying points a berth of at least one mile.

Oras bay (*Lat. $12^{\circ} 8' N.$, Long. $125^{\circ} 27' E.$*).—Between Ludo point and Bankari point, about $2\frac{1}{2}$ miles south-south-eastward, the coast recedes about 2 miles south-westward, forming a semicircular basin about 2 miles in diameter, in the north-west part of which is the mouth of the Oras river. The entrance points are fringed with reefs, but the rest of the bay has anchorage depths of from 4 to 8 fathoms, and is clear, with the exception of a sunken rock with 2 fathoms on it lying three-quarters of a mile from the northern shore. Oras is a small town on the river of that name, about half a mile from its mouth. There is a buoyed channel for small craft drawing not more than 5 feet.

Directions.—To enter Oras bay, bring the north end of Tubabao island to bear East, and steer West for the middle of the entrance, giving Bankari point on the south side a berth of three-quarters of a mile. When the small bushy islet in the river entrance bears N.W., steer for it, and anchor according to draught. A depth of $4\frac{1}{2}$ fathoms will be found three-quarters of a mile south-eastward of the bushy islet.

Coast.—From Bankari point the coast trends south-eastward about 4 miles to Cabra point, and is very irregular, being indented by bays, the entrances of which are blocked by reefs and islets. Uguis islet, three-quarters of a mile eastward of Bankari point, is wooded and surrounded by a reef which extends 4 cables eastward.

Baktol bay, one mile southward of Uguis islet, has depths of from $3\frac{1}{2}$ to 7 fathoms, and affords good anchorage for small vessels. Baktol island and surrounding reefs protect this anchorage from easterly winds. The approach to the anchorage should not be attempted without local knowledge unless the reefs are visible.

Cabra point is prominent, clear, and steep-to. A dangerous shoal of $1\frac{1}{4}$ fathoms lies about one mile north of the point. Cabra point, bearing S. $\frac{1}{2}$ W., leads just eastward of it.

Coast.—From Cabra point the coast trends south-westward for about $10\frac{1}{2}$ miles to the entrance of the Tubig river. For the first 5 miles it is low, straight, and clean, the 5-fathoms line lying from half to three-quarters of a mile from the shore. Between Matinao and Tubig rivers the land is higher and heavily wooded, with man-

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E. groves along the shore, and for the last 4 miles the coast is very irregular and fringed with reefs. The only outlying dangers are a small patch of 3 feet half a mile southward of the mouth of Matinao river and three-quarters of a mile off-shore, and a large coral shoal of $1\frac{1}{2}$ fathoms lying $2\frac{1}{2}$ miles north-north-eastward of Tugasan point and $1\frac{1}{2}$ miles from the shore.

Dolores river, which flows into the sea about $2\frac{1}{2}$ miles south-westward of Cabra point, has about 2 feet of water on the bar at low water. At high water there is a depth of 7 feet in a channel marked by stakes, and it is reported that small launches drawing 6 feet can ascend the river for a distance of 32 miles. The town of Dolores lies on the northern bank of the river just within the bar.

Matinao (Ulut) river, which discharges 3 miles south-west of Dolores river, has very little water on the bar, which can only be crossed by small boats.

Tugasan point (*Lat. 11° 55' N., Long. 125° 26' E.*), the northern entrance point of the Tubig river, is low and bordered by a reef which extends half a mile eastward from it. The Tubig river has a depth of 6 feet on the bar at low water, and deeper water inside. Taft is a small town situated on the southern entrance point of the river.

Anchorage.—The usual anchorage for Taft is in 10 fathoms, mud, with the town bearing West and Pindilin point South; it is frequently untenable during the north-east monsoon, when fairly-protected anchorage may be found westward of Makate island, in 9 fathoms.

Small vessels drawing less than 12 feet can find good anchorage in 3 to 4 fathoms in a basin, 3 cables in diameter, south-eastward of the town, about a quarter of a mile north-westward of a small sand cay. A pilot for this anchorage and also for the river can be procured if desired.

Directions.—Vessels leaving Taft should keep the town bearing West until Cabra point bears N.N.E. if bound northward, or until the same point bears N. $\frac{1}{2}$ E. if bound southward.

Coast.—From the entrance to the Tubig river the coast trends south-south-east for over 2 miles to Pindilin point, and is a sandy beach backed by cocoanut trees. It then curves southward to Taig point $3\frac{1}{2}$ miles distant, forming Sulat bay, which is fronted by four islands, all surrounded by reefs, leaving narrow boat channels between them and also between them and the coast.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

Makate island, the northernmost of the above mentioned, is small, low, covered with cocoanut trees, and fringed with mangroves. Its reef extends two-thirds of a mile north-eastward.

Shoal.—A rocky patch of $3\frac{1}{4}$ fathoms least water lies $1\frac{1}{4}$ miles N. 49° E. from Makate island, the channel between being over half a mile wide, clear and deep.

Makalayo island, three-quarters of a mile south-westward of Makate, is low and wooded, with a hill 84 feet high at its southern end.

Katalaban (*Lat. $11^\circ 52'$ N., Long. $125^\circ 28'$ E.*), the largest of this group, is over $1\frac{1}{2}$ miles long east and west, and about half a mile wide at the ends, which are about 100 feet high, and are connected by a low isthmus covered with cocoanut trees. It is surrounded by a reef which extends 4 cables seaward from the eastern end. The village of San Vicente lies on the south side of the island.

Rock.—A rock, awash, lies a quarter of a mile south of the east end of Katalaban island.

Anahau island, south of the west end of Katalaban, is triangular in shape, about half a mile in extent, and covered with cocoanut trees.

Taig point, forming the southern shore of Sulat bay, has a long and wide reef, dry at low water, extending $1\frac{1}{4}$ miles north-eastward from it, and on which are four small rocky islets; the northern islet is 16 feet high. The point is fringed with mangroves, with cocoanut trees behind them.

Sulat bay is a deep indentation in the coast open to the north-east. The water at the head of the bay is shoal, otherwise the bay is free from danger except a small patch of 3 feet lying three-quarters of a mile south-eastward of Anahau island. The anchorage depths are from 2 to 10 fathoms. A heavy sea sets into the bay during the north-east monsoon, and during that period, better anchorage may be found off the village of San Vicente, south side of Katalaban island. The town of Sulat is on the east bank of the river of that name, which discharges just westward of Taig point. The most conspicuous object in the town consists of the walls of a large ruined church.

Directions.—To enter Sulat bay, bring the south end of Anahau, the southern island in the bay, to bear W. by S., and steer for it; when the ruins of the church in Sulat bear S. by W. $\frac{1}{4}$ W., they should be steered for, and anchorage taken up in 5 fathoms, mud, about three-quarters of a mile northward of Taig point; inside of this position the water shoals rapidly.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E.

Paninihian point is the broad projection of the coast separating Sulat from Port Libas, about 3 miles southward. The reef from Taig point continues southward, and surrounds Paninihian point to a distance of more than a quarter of a mile in places; it has many large boulders on it and deep water close to its edge.

Plan of Port Libas on 1622.

PORT LIBAS (Lat. $11^{\circ} 46' N.$, Long. $125^{\circ} 27' E.$) is $3\frac{1}{2}$ cables wide at the entrance between the reefs on either side, and penetrates about 3 miles westward. The depth at the entrance is 17 fathoms, shoaling to 5 fathoms at about one mile within.

The shore of the bay is very irregular, being broken up by five projecting points, with bays between, all of which are shoal; the points have reefs, dry at low water, projecting from them.

Tubigan point is the second point inside the entrance on the north side of the port; it forms the western side of a bay, at the head of which is the village of Remedios.

Palan point is the western side of the southern entrance point where the coast turns sharply southward. San Julian, the largest town in the port, is situated immediately southward of Palan point.

Magnana point is the most conspicuous and readily identified point in the port, and bears about S. 63° W. when first opened southward of Kannomanda point on the north side of the entrance. Immediately behind Magnana point are some steep conical hills, the highest of which, Mount Magnagua, 285 feet, is a mark for entering the port.

Anchorage.—There is anchorage, open to the eastward, for about $1\frac{1}{2}$ miles within the entrance over a width of half a mile, in from 12 to 2 fathoms. In the middle of the port northward of Palan point the depth is 9 fathoms, decreasing gradually westward; the bottom is mud. Small vessels in smooth weather can anchor in about 16 feet, sand, between Tubigan and Magnana points.

Directions.—From a position about one mile off-shore, bring Mount Magnagua to bear S. 69° W., when it should be under the depression between the horns of a saddle-shaped mountain in the interior, a little nearer the southern and higher horn than the northern, and steer in on this line, which will lead midway between the reef extending from the northern entrance point and the edge of the foul ground outside the reef on the southern side. When San Julian begins to open westward of Palan point, haul north-westward for Tubigan point, and anchor about 4 cables eastward of it in 5 fathoms, or as convenient.

Tides.—It is high water at Port Libas, full and change, at 6h. 10m.; springs rise 3 to $7\frac{1}{2}$ feet.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0° 50' E.

Coast.—From Nahibil point (*Lat. 11° 46' N., Long. 125° 28' E.*), south side of entrance to Port Libas, the coast trends south-south-eastward for $5\frac{1}{2}$ miles to Anitaguipan point, and is low, covered with cocoanut trees and fringed with mangroves. The shore reef which fringes Nahibil point continues southward with several breaks nearly to Anitaguipan point. The small bays on this part of the coast are nearly blocked by reefs and of little value to navigation.

Anitaguipan point is a bold, rocky, steep-to headland, 282 feet in height, and well wooded. The shore reef fringing the coast from Port Libas ends a short distance northward of the point, leaving it exposed to wave-action, which has so undermined the base that the upper part overhangs the sea.

From Kapinas point, nearly one mile south-westward of Anitaguipan point, the coast trends westward and southward, forming a large bay with a very irregular coastline to Lalaugan point, situated 5 miles S. by W. from Anitaguipan point. Andis island lies in the middle of the entrance to this bay, dividing it into two parts. Napla bay, the northern part, affords good anchorage in from 5 to 20 fathoms, in a basin about one mile in diameter, but it is not recommended in the north-east monsoon, as easterly winds send in a very heavy sea. There are several villages on the shores of the bay.

Plan of Port Borongan on 1622.

Andis island, lying $1\frac{1}{2}$ miles south-westward of Anitaguipan point, is more than a mile long north-north-west and south-south-east, and half a mile wide at the northern end, tapering to a point at the southern. Amogotada point, the north-eastern extremity, is a rocky headland over 100 feet high; the south point is also rocky, but not so high. A reef surrounds the island except at the north-west point, which is low and sandy. There is a narrow boat channel between the north-western extreme of Andis island, and the reefs extending from the mainland.

Divinubo island, on the south side of the entrance to Port Borongan, lies $1\frac{3}{4}$ miles south-south-eastward of Andis island. It is of moderate height, about half a mile in diameter, and its northern and eastern sides are bordered by reefs extending 2 cables off. Divinubo is almost connected with Lalaugan point, nearly $1\frac{1}{2}$ miles westward by reefs, dry at low water, on which are some small islets and boulders. For light, see next page.

Port Borongan is $1\frac{3}{4}$ miles wide at the entrance, between the south point of Andis island and the north side of Divinubo island, and extends over 3 miles westward. The entrance channel is clear, deep, and nearly $1\frac{1}{2}$ miles wide between the shoals on either side. At

General charts 2577, 943, 1263.

Plan of Port Borongan on 1622. Var. 0° 50' E.

the head of the port a point projects eastward, beyond which a reef, dry at low water, extends half a mile, dividing the head of the port into two bays, of which the northern only is used. The Borongan river flows into the north-west part of the northern bay; there is a small landing pier eastward of the river entrance, and about half a mile eastward of the entrance is a small, low, bushy islet, surrounded by a reef about $1\frac{1}{2}$ cables wide. The Oom river discharges about one mile southward of the Borongan river, just northward of the point which divides the head of the port. Between the two river entrances there is a slightly curving sand-beach backed by cocoanut trees.

The depths in the port are from 5 to 19 fathoms.

Dangers.—A small rocky shoal, on which the sea breaks in bad weather, covered by a least depth of $2\frac{1}{2}$ fathoms, lies about 2 cables south-west of the south point of Andis island.

At about $1\frac{1}{2}$ miles S. 70° W. from the south point of Andis island is a small, steep-to rocky shoal, awash at low water, and marked by a breaker when there is the least sea.

LIGHTS.—**Divinubo island** (*Lat. $11^{\circ} 36'$ N., Long. $125^{\circ} 30'$ E.*).—A *white occulting* light every sixteen seconds, the eclipse lasting four seconds, elevated 136 feet above high water, and visible 15 miles in clear weather, is exhibited from a white framed structure over a house, the whole 46 feet high, erected on the summit of Divinubo island.

Borongan.—A *red fixed* light, elevated 29 feet above high water, and visible 7 miles in clear weather, is exhibited from a concrete pillar, 24 feet high, erected on the beach about $6\frac{1}{4}$ cables south-westward of the mouth of the Borongan river. *See* Light list.

Anchorage.—The usual anchorage for Borongan is in 5 or 6 fathoms south-westward of the bushy islet previously described lying off the mouth of the Borongan river. Under the lee of this islet there is usually some protection from the easterly swell. The southern bay is never used for anchorage.

There is also sheltered anchorage in 10 or 12 fathoms, westward of the northern part of Andis island; this anchorage is stated to be the best typhoon shelter in the vicinity.

Directions.—To enter Port Borongan, pass midway between Andis and Divinubo islands on a West course, looking out for the rocky shoal S. 70° W. from the south end of Andis island. When Anitaguipan point bears N.N.E. the shoal will be abaft the beam, and course should be shaped to pass $3\frac{1}{4}$ to 4 cables southward of the bushy islet eastward of the Borongan river, and anchorage taken up as previously described.

General charts 2577, 943, 1263.

Plan of Port Borongan on 1622. Var. 0° 50' E.

At night, having passed between Andis and Divinubo islands, steer to bring the *red* light on the beach south-westward of Borongan river to bear S. 89° W., and steer for it; this will lead nearly midway between the reef extending eastward from the point dividing the two bays and the reef surrounding the bushy islet above mentioned, the channel between which is over half a mile wide.

To reach the anchorage westward of the northern part of Andis island, round the southern end of that island at the distance of half a mile, haul north-westward and anchor in 10 or 12 fathoms, mud, about 3 cables from the shore, with Anitaguipan point just open of the north-west extreme of Andis island.

Borongan town (*Lat. 11° 37' N., Long. 125° 26' E.*), the most important town on the east coast of Samar, with a population at the last census of 4,360, lies near the mouth of the Oom river in the southern part of the northern bay; it is obscured from seaward by cocoanut trees.

Tide.—It is high water, full and change, approximately, at 6h. 18m.; rise about 4½ feet.

Chart 2577, Between San Bernardino and Mindoro straits.

Coast.—From Lalaugan point, south side of Port Borongan, the coast trends south-south-eastward, with a slight curve westward, for 7½ miles to Minasangan island, at the entrance to Kabay bay. The first 4 miles consist of sandy beach interrupted in places by rocky bluffs reaching to the sea; farther on, as far as Maiduun islets, the coastline is irregular with rocky points bordered by reefs, and with short sand beaches here and there between them. Thence to Minasangan island the shore is low and bordered by a wide reef.

Suribao river, with about 2 feet on its bar at low water, and deeper water inside, discharges about 3 miles southward of Lalaugan point. It is about 1½ cables wide just inside the mouth, and is separated from the sea by a low sandy point extending from the bluff on the north side to within a short distance of the rocky bluff on the south side, confining the river to a narrow channel. The village of Suribao lies on the north of the river just inside the sandy point at the entrance. The 10-fathoms line is a good distance from the shore off this river and the beaches on either side of it.

Maiduun islets, situated about 5 miles southward of Divinubo island, are two wooded islets at high water only, being surrounded by a broad reef stretching out from the mainland. This reef dries at low water for half a mile north-eastward of the islets, then turns northward for three-quarters of a mile, the last half-mile being sunken; it should be given a wide berth.

General charts 2577, 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$.

Maydolong is a small village on the mainland about one mile west of Maiduun islands. A small but fair anchorage may be found here between the shore reef and some detached reefs to the eastward, by bringing the west side of Divinubo island in line with Anitaguipan point, N. 5° W., and steering in with that mark astern until a large coral boulder in a small bight on the mainland bears W.S.W., where anchorage may be had in 10 fathoms, mud. Vessels from the southward should not haul in for above mark until they are about 2 miles northward of Maiduun islands.

Minasangan island (*Lat. $11^{\circ}29'N$, Long. $125^{\circ}32'E$*), lying close to the land at the northern side of the entrance to Kabay bay, is half a mile long east and west, one cable wide, and 64 feet high. The island and coast behind it are covered with trees, mostly cocoanut palms. The eastern extreme of the island is a shelving rock with deep water close-to, and on which the sea breaks heavily even in moderate weather. The south side of the island is steep-to.

Kabay bay, south-westward of Minasangan island, is one mile wide at the entrance, and extends $2\frac{1}{2}$ miles south-westward, narrowing towards the head. The shores are fringed by narrow reefs, leaving plenty of space for anchorage in from 5 to 20 fathoms, exposed to north-east winds and seas. The village of Kabay lies at the head of the bay.

Coast.—From the south entrance point of Kabay bay the coast trends south-eastward for about $8\frac{1}{2}$ miles to Tugnug point, and is indented with bays, fringed by reefs, and fronted by several islands.

Minanut island lies about 2 miles south-eastward of the southern entrance point of Kabay bay, and is triangular in shape. The north and north-east sides are faced by perpendicular cliffs, nearly 100 feet high; the south-west point is low and sandy. The north point is clean and steep-to; the rest of the island is surrounded by a reef.

Minanut anchorage is a cove one mile wide and about 4 cables deep, lying southward of San Miguel point; Minanut island, lying in the entrance protects it from north-east winds. The anchorage, which has depths of from 9 to 11 fathoms, is not recommended during the typhoon season nor in strong north-east monsoon weather, as the breakers on the reefs at the northern entrance induce strong currents, which cause a vessel to sheer about.

Directions.—The northern entrance is not recommended, as it is nearly blocked by reefs, leaving a narrow deep channel between them.

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50'E.

To approach the anchorage from the southward, pass about 3 cables southward of Minanut island, looking out for reefs on either side, and as soon as San Miguel point opens westward of Minanut, haul northward and anchor in the middle of the cove in 9 or 10 fathoms, mud, with San Miguel point bearing N. by W., and the south-east point of Minanut island open of the south-west point. There is a good boat landing in a break in the reef on the south-west side of the cove.

Coast.—The Lanang river discharges about one mile south-west of Minanut island, immediately under a rocky point fringed with mangroves and surrounded by a reef. The south side of the river is a low sand point, and from here the shore is a sandy beach for one mile south-eastward; here a rocky point extends three-quarters of a mile eastward. Iniyao islet, small and 90 feet high, is connected with the coast by a reef, dry at low water; it lies half a mile eastward of the rocky point last mentioned, and between is a bay about a mile deep, with its shores fringed by reefs.

Llorente (*Lat. 11° 25' N., Long. 125° 33' E.*).—The town of Llorente lies on a low grassy flat on the south side of the entrance to the Lanang river. The ruins of a church and some buildings are seen from seaward, and a tall flagstaff is the most conspicuous object in the place. The town is small and offers few resources. Coasting steamers call, and some business is done in hemp and copra.

Anchorage.—The usual anchorage is in 10 fathoms, about half a mile eastward of the mouth of the river; small vessels can anchor closer in, in 7 or 5 fathoms. These anchorages are sometimes untenable during the north-east monsoon.

Coast.—From Iniyao island to Tugnug point, about 4 miles south-eastward, the coast consists of rocky cliffs from 40 to 90 feet high, and is bordered by reefs a quarter of a mile wide which fill up the various indentations in the coastline; these reefs disappear at Tugnug point. The cliffs are nearly perpendicular, with the tops covered with trees and bushes; a short distance inland the land rises to a height of from 300 to 500 feet, and is heavily wooded.

Just southward of Tugnug point is a small cove about a quarter of a mile in extent and very deep, its head is filled with coral; here the coast, for nearly a mile southward to Agdan point, consists of perpendicular, steep-to cliffs, from 25 to 50 feet high. This bluff headland is conspicuous when seen from north or south, as it rises to a height of 200 feet to the tops of the trees at a short distance from the cliffs.

Nagaha bay, on the south-west side of Agdan point, is over half a mile wide at the entrance, and extends about 4 cables westward;

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. 0°50' E. its shores are mostly low, and fringed with coral. In the north-east corner of the bay is a small beach with a cocoanut grove behind it, where landing could probably be made at any time.

Anchorage in fine weather may be had in 12 to 16 fathoms in the middle of the bay, south-westward of Agdan point.

Panadlihan point, on the south side of Nagaha bay, is a thinly-wooded peninsula about a quarter of a mile in extent. It is faced by cliffs from 30 to 40 feet high, and rises in the centre to a height of 50 feet.

Bura point, $1\frac{1}{2}$ miles south-west of Panadlihan point, is low, but is conspicuous from its terminating in a line of black rocks from 20 to 30 feet high. There are no sunken dangers outside the visible rocks. The bay between the two points is filled with a reef with the exception of a small break half a mile northward of Bura point, leading to the mouth of Hernani river. The village of Hernani lies about a quarter of a mile westward of Panadlihan point.

MATARINAO BAY, situated between Bura point and Matarinao point, nearly 5 miles south-south-westward, is the largest, best protected, and most accessible harbour on the east coast of Samar. Both sides of the entrance are formed by broad reefs, leaving a deep narrow channel between them which leads to the various anchorages in the bay. The reefs, partly dry at low water, are generally marked by breakers, and are readily discernible at all times. The depths in the bay available for anchorage are from 4 to 12 fathoms. There are several villages on the shores of the bay, Pambuhan, situated westward of the south end of Anahao island being the only one of any importance; some hemp and copra are shipped from here.

Islands.—There are several islands on the north-west side of the entrance, all of which are surrounded by reefs, dry at low water. Lalaugan island, $2\frac{3}{4}$ miles south-westward from Bura point, is 266 feet high. The reefs surrounding Lalaugan island extend $1\frac{1}{2}$ miles southward, and form the north-west side of the channel into the bay. Anahao island, the largest and southernmost of the group just mentioned, is low, and covered with mangroves.

Other prominent islets in the bay are:—

Minadion islet, lying about $1\frac{1}{2}$ miles southward of Anahao, and 6 cables from the western shore, is low, rocky, and covered with dark trees, which show up well against the mangroves on the shore behind it.

Minaloa islet (*Lat. 11° 14' N., Long. 125° 34' E.*), three-quarters of a mile east-north-east from Minadion, is the highest of the group

General charts 943, 1263.

Chart 2577, Between San Bernardino and Mindoro straits. Var. $0^{\circ}50'E$. lying in the opening of the bay. It is 143 feet high, with a rounded wooded top, making a good landmark, and can be seen from a long distance seaward.

Linoa islet, lying nearly 4 cables north-westward from Matarinao point, is 81 feet high, and heavily wooded. Kanadag islet, one-third of a mile southward of Linoa, and the same distance westward of Matarinao point, is low and flat, with a bright sandy beach, and is covered with brush and some cocoanut trees.

Pou rock is a small black rock, about 12 feet high, on a bright sand cay, which is almost awash at high water, situated half a mile N. 66° W. from Kanadag islet.

Shoals.—A shoal with a least depth of 3 feet, lies S. 20° W., about $3\frac{3}{4}$ cables from Pou rock, and another shoal, with a least depth of 2 feet, lies S. 25° E., distant $4\frac{3}{4}$ cables from the same rock.

Anchorage.—The usual anchorage for large vessels is in 7 fathoms, mud, about half a mile south-west of the south end of Anahao island; small vessels can anchor farther northward in not less than 5 fathoms, as the reefs are steep-to. This anchorage is well protected, but better anchorage in typhoon weather can be found about $3\frac{1}{2}$ cables westward of Kanadag islet in a basin $3\frac{1}{2}$ cables in diameter.

The southern part of the bay offers a large area of well-protected anchorage, but it is encumbered by numerous small reefs, which dry at low water, and by shoal patches, which make it difficult of access.

Directions.—To enter Matarinao bay, when well outside the reefs, bring Minaloa to bear S. 37° W., and steer for it; when Kanadag is well open west of Linoa and the south end of Anahao island bears S. 76° W., the vessel will be in the entrance to the channel. From here steer S. 68° W., heading about a quarter of a mile southward of the south end of Anahao island, and keeping a good lookout for the reefs on either side. When Pou rock is abeam, the narrowest part of the channel (about $3\frac{3}{4}$ cables) will have been passed, and when Minaloa is abeam the vessel may be hauled westward for the anchorage off the south point of Anahao island (*Lat. $11^{\circ} 15' N.$, Long. $125^{\circ} 33' E.$*).

To reach the anchorage westward of Kanadag islet, having brought Pou rock abeam on the track just described, steer S. 17° W. for Minaloa islet, and when Pou rock is abeam steer S. 35° E. between it and Minaloa. When Pou rock is again abeam haul eastward, avoiding the shoal of 3 feet described previously, and anchor in 7 fathoms, mud, with the south end of Kanadag islet bearing N. 89° E. and Pou rock N. 11° W.

General charts 943, 1263.

Charts 2577, 2578. Var. 1° E.

Coast.—From Matarinao point the coast trends south-eastward for about 27 miles, forming a narrow peninsula (Guiuan) between the Pacific and the shoal bay to the westward. A chain of islands, comprising Kalikoan, Lelebun, and Kandolu, extends south-eastward, forming a prolongation of this peninsula, and from a distance appears part of it.

The most remarkable feature of this section of the coast is a bold coral ridge, about 400 feet high in places, that reaches from Matarinao point to Sungi point, the southern extremity of Kandolu island. At several places it is broken by steep gaps, and at one place it disappears for over a mile, but the general impression is one of uniform height, smooth, even sky-line, and vertical sea faces, over 300 feet high, usually covered with bushes, but sometimes entirely bare. The ridge is from $1\frac{1}{2}$ to $3\frac{1}{4}$ cables wide, and its western slope is gentle; there is a belt of low level land between it and the sea. The shore line consists of high sand beaches and coral bluffs alternately, the latter averaging 20 feet in height.

Asgad and Pananamitan points, situated 5 and $7\frac{1}{2}$ miles, respectively, south-eastward from Matarinao point, are fairly prominent. Bagtong point, situated 5 miles south-eastward from Pananamitan point, is not distinguishable from the sea, being merely a bluff 20 or 30 feet high on a concave coast. From just northward of Asgad point to about $3\frac{1}{4}$ miles southward, the coral cliffs are vertical, mostly bare, and very conspicuous. Farther south the ridge is broken up into heavily wooded hills; the most noticeable bluff in this peculiar ridge is at Bagtong point, where it is 408 feet high. From this point to Luyong point, 2 miles south-eastward, the ridge is one vertical wall of coral rock with a few bushes on it.

From Matarinao point to Luyong point the coast is fringed by a reef averaging $1\frac{1}{4}$ cables in width; thence to Kalikoan pass, $1\frac{1}{2}$ miles southward, it widens out to a distance of about half a mile.

Chart 2578, Eastern part of Sulu or Mindoro sea.

Kalikoan island (*Lat. $11^{\circ} 0' N.$, Long. $125^{\circ} 48' E.$*), the first island south-eastward from the peninsula, is about 7 miles long, $1\frac{1}{4}$ miles wide, and is separated from the peninsula by Kalikoan pass, partly dry at low water, but passable by boats at high water. It contains a ridge of hills similar to those on the peninsula, from 250 to 350 feet in height. The bluff facing Kalikoan pass is nearly vertical, but soon changes into moderate slopes. For 5 miles south-eastward from the pass there is no shore reef, the coast being formed of coral rock 20 feet high. From here a fringing reef extends along the remainder of the island and the eastern coasts of Lelebun and Kandolu

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° E.

islands, where it is about half a mile wide, continuing round Sungi point into Guiuan bay. There are several villages on the west coast of Kalikoan island.

Lelebun island, lying immediately southward of Kalikoan island, is very small, and about 200 feet high; the village of Salanga is on the west side.

Kandolu island, the southern of the chain, lying immediately southward of Lelebun, is about one mile long north and south, and half a mile wide. It is 188 feet high, and well wooded.

The SOUTH COAST of SAMAR.—**Sungi point** (*Lat. 10° 55' N., Long. 125° 50' E.*), the south-eastern extreme of Samar, is the southern end of Kandolu island. It is 150 feet high, and surrounded by reefs to a distance of half a mile. Patches of $2\frac{1}{4}$ fathoms lie less than a mile south-eastward, and south-westward of Sungi point.

Apart from these shoals the channel between Sungi point and Homonhon (Malhon) island, 9 miles south-westward, is clean and deep, not less than 9 fathoms being found in it. The water is clear, and the bottom may frequently be seen; this, added to the presence of tide rips and overfalls, has probably led to the reports of dangers in this channel. Vessels rounding Sungi point should give it a berth of at least $1\frac{1}{2}$ miles. The reefs which surround Sungi point continue westward to within one mile of Manikani island, and then curve north-eastward towards the town of Guiuan; they are extensive, dry at low water in many places, and have deep channels between them, where good anchorage may be obtained, protected from the sea, available for those with local knowledge.

Manikani island, about 12 miles west-north-west of Sungi point, is nearly circular, about $2\frac{1}{2}$ miles in diameter, and 534 feet high. It is surrounded by a reef less than half a mile wide on all sides except the north-west, where it extends 5 miles north-westward, with a greatest width of 2 miles, and having on its end Baul islet. Between the island and reef of Manikani and the main coast reef, there is a deep channel running 8 miles south-east and north-west, with several small islets and shoals in it. Vessels of all sizes can find anchorage in the channel by avoiding the coral patches.

The southern entrance to this channel is between the south-east point of Manikani and a coral patch, awash, lying about one mile from it, and has a depth of 12 fathoms in the middle. At 7 cables north-east of Manikani there is a rock which dries at low water, and which can be passed on either side, but the best course to follow is to leave this rock and Kambasingan and Kabalarian islets to the south-west, and

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° E.

Kaninoan islet to the north-east. Good anchorage may be found off the north-east side of Kabalarian islet, in 12 or 14 fathoms.

The northern entrance, between Balinatio islet on the north shore of the bay, and the islets Baul and Binabasalan, is three-quarters of a mile wide with a depth of 18 to 20 fathoms. A shoal of $1\frac{3}{4}$ fathoms lies in mid-channel between Binabasalan and Balinatio islets, and in the channel between the reef half a mile eastward from Binabasalan and the anchorage there are a number of coral patches which can generally be seen and avoided. The small islets in this vicinity are all of white sand and wooded, except Kambasingan, which is of sand and low rocks nearly awash.

Guiuan (*Lat. 11° 2' N., Long. 125° 43' E.*) is a small town situated on the main, near the end of the peninsula of the same name. The approach to the anchorage is rendered narrow and tortuous by numerous reefs and shoals. The anchorage, though small, is well sheltered from the sea in south and south-west gales, but is exposed to winds from those directions.

Guiuan harbour.—Beacons and buoys.—The following beacons and buoys have been established in the approach to Guiuan, east of Manikani island:—

A beacon, consisting of a concrete base with a post surmounted by a square, painted white with red centre, has been erected on a rock on the southern side of the channel, with Guiuan church N. 53° E., distant more than one mile. A shoal of 2 fathoms lies westward of the beacon.

A beacon, consisting of a concrete base, on which is a post surmounted by a diamond shape, painted white with black centre, the top of which is 14 feet above mean sea level, has been erected on the south-eastern edge of the reef about $1\frac{1}{2}$ miles north-eastward of Manikani island, with Bar islet S. 34° E.

A red conical buoy, No. 2, is moored near the north-western edge of the reef south-eastward of Inatoulán island, in $5\frac{1}{2}$ fathoms, with Guiuan church N. 53° E.

Vessels should leave this buoy close-to on the starboard hand when entering, to avoid a rock lying a short distance to the north-westward.

A black can buoy is moored in 9 fathoms just south-east of a rock with 7 feet water on it, about half a mile east-north-east of the beacon last described.

A black can buoy, No. 1, in 6 fathoms, marks the south-eastern edge of a shoal which lies 8 cables S. 66° W. from Guiuan church.

Southern channel to Guiuan.—Beacons.—Three beacons are erected on the reefs to the westward of Kalikoan island in

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° E.

order to facilitate the use of a hitherto neglected but straight and convenient channel for vessels coming from the eastward of Sungi point and bound to Guiuan. They are situated as follows:—

A diamond-shaped beacon, 13 feet across, painted white with a black diamond in centre, on the small detached patch east-south-east of Bar islet reef, with Raton island N. 54° E.

A diamond-shaped beacon, 13 feet across, painted white with a black diamond in centre, with Raton island N. 21° W. and Kabadlongan point N. 28° E.

A beacon with a square daymark, 11 feet across, painted white with a red square in centre, with Raton islet N. 35° W. and Kabadlongan point N. 10° E.

Tides.—It is high water, full and change, at Guiuan, at 7h. 11m.; springs rise 2½ feet.

Directions.—Strangers entering Guiuan should take a pilot in case the buoys or beacons should be gone or out of position. Vessels should proceed slowly, depending more on a good lookout than on the lead, as most of the dangers are steep-to.

To enter, pass about half a mile southward of Manikani island, and bring Guiuan church and the highest point of the hill behind it in line, bearing N. 47° E., and steer in on this mark. When Bar islet, a small coral sand cay, is abeam on the starboard side, distant about half a mile, haul northward, and pass the first black buoy on the port hand; continue on passing close to the red buoy and beacon on the starboard hand and the second black buoy on the port hand, and anchorage will be found north-eastward of the black buoy in 4 fathoms, with the end of the wharf bearing N. 89° E., distant half a mile.

Salcedo (*Lat. 11° 9' N., Long. 125° 39' E.*) is situated at the head of the bay about 9 miles northward from Manikani island. The approach is narrow and intricate.

Kinapundan bay, situated north-westward of Manikani island, is nearly 4 miles wide between Balinatio island and Gigoso point, and extends about the same distance northward. It contains numerous islets and reefs, among which good protected anchorage may be found, the best and most easily accessible of which appears to be in the eastern part of the bay. Farther northward, at about 1½ miles from Balinatio island, the channel contracts to a width of about 2 cables, with mangrove islets on either side, and then widens out to a basin about three-quarters of a mile in extent, having depths of 10 to 14 fathoms over mud.

Directions.—To enter the eastern side of Kinapundan bay, pass about 3 cables westward of Balinatio island, and steer N. 13° W. for about three-quarters of a mile, and good anchorage will be found in 12 or 15 fathoms, mud. Perfectly protected anchorage will be

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° E.

found farther northward in the basin previously mentioned by continuing on the same course, keeping a good look out for islets and reefs. Caution is required on entering the last-named anchorage as the reefs are steep-to and the lead gives no warning.

Gigoso point (*Lat. 11° 5' N., Long. 125° 30' E.*), situated 8 miles N.W. $\frac{1}{2}$ W. from Manikani island, is low, but rises to a height of 408 feet about three-quarters of a mile inland.

Walker shoal, lying about 4 miles south-south-east from Gigoso point, is about half a mile in extent and awash at low water. From the south-west side of the shoal, the south-west side of Manikani island bears S. 69° E.

Coast.—From Gigoso point the coast trends westward for $16\frac{1}{2}$ miles as far as Capines point, the eastern entrance point of San Pedro bay, and forms between these points several bays with rocks and shoals surrounded by deep water in them. The villages along this coast offer few resources, and neither wood nor water can be procured.

Sua bay, 2 miles westward of Gigoso point is $1\frac{1}{2}$ miles wide at the entrance between Kagbanlio and Sua points, and extends the same distance northward.

Kablagna point, 6 miles westward of Gigoso point, is low and wooded; Lukson point, $2\frac{1}{2}$ miles north-westward of Kablagna point, is 400 feet high and conspicuous; and Lahuan point, $3\frac{1}{2}$ miles west-north-westward of Lukson point, is low. In the bay westward of Lahuan point there are anchorage depths of from 12 to 25 fathoms.

Shoals.—There are a number of dangerous shoals lying between Gigoso and Capines points. Walker shoal has been already described.

An extensive coral reef, partly awash, lies nearly one mile southward of Kablagna point, and about one mile westward of the same point is a shoal on which the least depth is $1\frac{1}{4}$ fathoms, with a rock awash north-westward of it. Gigoso point, bearing E. by N. $\frac{3}{4}$ N., leads southward of the shoal southward of Kablagna point.

Kalianan shoal, with rocks awash, extends 2 miles southward from Lahuan point. Kablagna point, bearing E. $\frac{1}{2}$ N., leads southward of it.

Capines point is clear and steep-to, and rises to a height of 400 feet within a quarter of a mile of the sea. Mantuaka point lies $1\frac{1}{2}$ miles N.W. by W. of Capines.

Vigia point, the western entrance point of San Pedro bay, is rocky, 384 feet high, and may be distinguished by an old fort on the top of the hill.

General charts 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

SAN PEDRO BAY is a large bay formed by the south-west coast of Samar and the east coast of Leite. It is 11 miles wide, between Capines point in Samar and Vigia point in Leite, and is of rectangular form, and extends 12 miles northward. The towns of Tanauan, Palo, and San Ricardo are situated in the western part, Takloban, the capital of Leite, in the north-western part, and Basey in the northern part of the bay. The eastern shore of the bay is sparsely settled. The San Joaquin and Palo rivers on the western side, and the Basey on the northern side, are the principal rivers discharging into the bay. The entire bay is encumbered by numerous small islets, reefs, and shoals, the position of which can be best understood by reference to the chart; the depths are from 2 to 18 fathoms. A brief description of those which principally concern the navigator is given below.

Basey river flows into the northern part of the bay; the water of this river is said to be salt for 8 miles up the stream as far as some limestone rocks, 40 feet high, which form a natural arch and picturesque grotto known as the *Cuevas de Sojotan*.

Kankabato bay.—From Kataisan point, the northern extreme of the western shore of San Pedro bay, the coast trends westward for one-third of a mile, then southward, westward and northward to Panirugan point, forming Kankabato bay, a large shallow bay 2 miles long north and south and one mile wide, in which there is anchorage in from 2 to $2\frac{1}{2}$ fathoms. The town of San Ricardo stands at the head of the bay.

Chart 2578, E. part of Sulu or Mindoro sea.

Islands and reefs in San Pedro bay.—**Marikitdakit islet** (*Lat. $11^{\circ} 4' N.$, Long. $125^{\circ} 9' E.$*), lying 5 miles W. by S. from Capines point, is a flat rock a foot or two above high water, on which are two rocky lumps about 18 feet high. A sunken rock, covered by 12 feet of water, lies about half a mile westward of the islet, and south-westward between the islet and the shore are several shoals with less than 5 fathoms on them.

Chart 2987, San Pedro bay to Libukan islands.

Iris shoal is about 50 yards in extent with a least known depth of $2\frac{1}{2}$ fathoms on it, lying S. 9° E. $2\frac{2}{10}$ miles from Punubulu islet.

Egbert shoals are two small patches covered by $2\frac{1}{2}$ and 2 fathoms of water, lying respectively S. 42° E. $3\frac{3}{4}$ miles and S. 29° E. about 4 miles from Dio islet. These patches lie 8 cables apart north-east and south-west, and have depths of 9 and 10 fathoms around and between them. Between Marikitdakit and the Iris and Egbert shoals are several patches of 3 to 5 fathoms.

Palo reef is a small reef, covered by 2 feet least water, lying

General charts 2577, 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° E.

5½ miles northward of Vigia point, abreast the town of Palo, and about one mile off-shore.

Dio islet, low and wooded, and about 1½ cables long north-west and south-east, lies 1¾ miles south-eastward of Kataisan point, and rather more than a mile off-shore.

Raso and **Badungbadung islets** lie about 4 miles north-eastward of Marikitdakit islet and one mile from the eastern shore of the bay. Raso, the westernmost and smaller islet, is very conspicuous, being shaped like an hour-glass, and more than 100 feet high. Badungbadung rises to a height of 130 feet.

Charts 2577, 2578.

Kamoropudan islets are a group of seven small islets from 55 to 150 feet in height; their bases are underworn by the sea until in some places the overhang is from 15 to 20 feet. They lie close to the eastern shore of the bay.

Chart 2987, San Pedro bay to Libukan islands.

Punubulu islet, lying E. ½ S., 3½ miles from Dio islet, is about 300 yards long east and west and 150 yards wide; it is low and wooded.

Foul ground, with rocks awash, extends about one mile south-south-eastward of Punubulu, and a shoal, with a depth of 3 fathoms, lies about 3½ miles S. 16° E. from the same islet.

A small shoal with rocks awash lies rather more than a mile N.W. by N. from Punubulu.

Shoals.—Buoys.—A shoal about 3 miles long and three-quarters of a mile broad, with a least depth of 2 feet over it, extends eastward from Panirugan point, and forms the south side of the channel leading into San Juanico strait. It is marked by three black can buoys—No. 1 on the eastern extreme, No. 3 at the north-eastern bend of the shoal, and No. 5 on the northern edge of the shoal nearly midway between No. 3 buoy and Panirugan point.

A rock with less than 6 feet of water over it lies at the edge of a shoal bank extending 8 cables from the Samar shore on the north side of the entrance channel. It is marked by a red conical buoy, No. 2.

Hinamok island, 60 feet in height, well wooded, and surrounded by shoal water, lies south of the town of Basey; the shore bank extends 1¾ miles south-east of the island. The island is about one mile long north-west and south-east and half a mile wide.

Light (*Lat. 11° 15' N., Long. 125° 0' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 96 feet above high water, from a white frame structure on a hill close to

General charts 2577, 2578, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

an old fort, a quarter of a mile west of Panirugan point. For arc of visibility, see Light list and chart.

Takloban anchorage.—The usual anchorage in the harbour is $1\frac{1}{2}$ to 2 cables north and north-west of Takloban, in from $2\frac{1}{2}$ to 3 fathoms, mud, although the deep water is found farther north.

Takloban, the capital and largest town of Leite, stands on the south side of Panirugan point, and facing San Juanico strait. There are a number of small wharves, two of which have 15 to 18 feet of water alongside them; loading and discharging are easy. Vessels drawing 18 to 20 feet of water can enter the harbour from the southward, but larger vessels are obliged to bring up in the vicinity of Dio islet in 5 to 6 fathoms, mud. No supplies, fresh water, or coal are obtainable. Steamers from Manila trade fortnightly with Takloban, which is a telegraph station.

Telegraph.—A telegraph cable is laid from Takloban to San Antonio in Samar, about $1\frac{1}{2}$ miles to the northward.

Pilots.—Pilotage is not compulsory for merchant vessels through Hanabatas channel, San Juanico strait, and in and out of Takloban, but strangers should employ pilots. They may be obtained at Kananai island, at Hinamok island, eastward of Takloban, and at Takloban. They will take vessels through the strait drawing 18 feet. An anchor should always be ready for letting go.

Tides.—It is high water, full and change, at Takloban, at 7h. 11m.; springs rise $2\frac{1}{4}$ feet.

Charts 2987, 2578.

Directions.—Moderate sized vessels from the southward should pass from $1\frac{1}{2}$ to 2 miles westward of Marikitdakit islet, and thence steer N.W. until Basey church opens westward of Hinamok N. 1° W., which mark will lead up to the channel leading into Takloban and San Juanico strait, 3 cables wide, and well marked by buoys.

Should Basey church not be recognised when it opens of Hinamok, steer for Dio islet on a N. by W. bearing, and when the mark is distinguished, bring it on and proceed as above directed.

If, when approaching the channel with Basey church bearing N. 1° W., the buoys should be gone or out of position, the following directions should be observed: When Mount Danglay (1,136 feet), northward of Takloban, bears N. 60° W., it should be steered for until Anibun point, the first point north-westward of Takloban, bears N. 88° W., when steer for it, and when abreast of Panirugan point, haul southward, and anchor off the wharves in 16 or 18 feet, mud.

Vessels of light draught from the eastward should pass about a mile from Capines and Mantuaka points and Raso islet, and steer N. 52° W. until Dio islet is sighted, when bring it on the above bearing

General charts 2577, 2578, 943, 1263.

Charts 2987, 2578. Var. 1° E.

and steer for it until Basey church is just open of the north-west point of Hinamok island, when the previous directions should be followed.

Dio islet, steered for on a N. 52° W. bearing, should carry a vessel nearly midway between the north-eastern Egbert shoal and Iris shoal, passing about half a mile from each, but passes close to a 3-fathoms patch southward of the latter shoal.

Deep-draught vessels should bring Capines point to bear S. 80° E., and steer N. 80° W. until Dio islet bears N. 10° W., when it should be steered for and anchorage taken up about half a mile from it in 5 or 6 fathoms, mud. There is a patch of 3½ fathoms about 3 cables south-westward of Dio islet.

Chart 2987, San Pedro bay to Libukan islands.

SAN JUANICO STRAIT, which separates the islands of Samar and Leite, is 12 miles long in a general north and south direction between Takloban harbour and Hanabatas channel. It has an average width of 6 cables, but numerous islets and shoals line the route and confine the channel, reducing it in one place to a width of barely 1½ cables. The flood stream sets north and the ebb south, with a velocity of 6 knots at the equinox, and the strait is difficult to navigate on account of the strong currents and the confined width. The depth of the channel varies from 4½ to 12 fathoms.

Tides.—It is high water at Santa Elena, San Juanico strait, at 9h. 54m.; springs rise 3 feet.

The southern entrance lies between the projecting Panirugan point, in Leite, and Binatak point on the opposite coast of Samar, nearly a mile apart; the channel carries a depth of 4¾ to 7 fathoms, but 3½ fathoms must be passed over, as charted, before reaching it from the southward.

Dangers.—Buoy.—A shoal which dries is situated with the south of Kabalanan island bearing N. 17° E., distant about 3 cables. It is marked by a black can buoy, in 5 fathoms, on its western side. Vessels must pass to the westward of this buoy.

Beacons.—A beacon, 12 feet high, consisting of a post having two white square daymarks with red square centres, has been erected on a shoal with very little water over it, and possibly awash at extreme low tides, at 3 cables S. 77° E. from Kaguaian point. Vessels should give this beacon a berth of at least 50 yards, and should pass eastward of it.

A shoal (*Lat. 11° 22' N., Long. 124° 59' E.*), marked by a white diamond-shaped beacon, 12 feet high, with a black centre, is situated 3 cables south-eastward of Uban point. Vessels should not pass eastward of this beacon.

General charts 2577, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

A beacon, 14 feet high, consisting of a post surmounted by two top-marks at right angles, painted white, with a black centre, has been erected on Santa Rita rock, situated to the eastward of Nababui island. The channel is westward of the beacon.

There is a small rocky patch covered by 2 feet least water lying about a quarter of a mile southward of the above beacon.

Southward of Nababui island there is a narrow passage that is sometimes used by small vessels when the tide serves.

Santa Rita island; *see* page 635.

Buoy.—A red conical buoy, marked No. 2, is moored in 6 fathoms off the shoal extending northward of Bakol island, $1\frac{1}{2}$ cables south-westward of Santa Rita island, to mark the south side of the northern entrance to San Juanico strait. Vessels should pass between this buoy and Santa Rita island.

There are strong tide-rips in Santa Rita pass.

Hanabatas channel, the northern approach to San Juanico strait, runs from west to east, between Samar and Leite, for a distance of 8 miles as far as Santa Rita island. It is 2 miles wide at the entrance; the narrowest part, about three-quarters of a mile wide, is between Dabun island on the north and Kaltagan and Navahay islands on the south. There are several islets and much shoal ground in it. The depth is irregular, and varies from 2 fathoms north-eastward of Navahay to 5 and 19 fathoms at the entrance of San Juanico strait. The velocity of the tidal streams in this part is about one knot, the flood stream setting to the west, and the ebb to the east.

Baluarte point forms the southern entrance point of Hanabatas channel. It is clean and steep-to, and the land behind it rises quickly to a height of 1,300 feet, forming a good landmark for making the channel.

Kananai (Kanaui) island, lying on the south side of the channel, about 2 miles eastward of Baluarte point, is clear and steep-to.

Pilots for San Juanico strait may be obtained here.

LIGHT (*Lat. 11° 21' N., Long. 124° 51' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited, at an elevation of 33 feet above high water, from supports above a shed 19 feet high, and all painted white, erected on the north side of Kananai island. For arc of visibility, *see* Light list and chart.

Ivantakut island, lying about $1\frac{1}{2}$ miles east-north-east from Kananai island, is small, low, and wooded, and can be passed close-to on the northern side.

General charts 2577, 943, 1263.

Chart 2987, San Pedro bay to Libukan islands. Var. 1° E.

Kaltagan and **Navahay** are two larger islands lying near the shore on the south side of the channel.

Rock.—A rock, covered by 3 feet of water, is reported to exist on the south side of the fairway through Hanabatas channel, half a mile N. 29° E. from the eastern extreme of Navahay island.

Dabun island, lying on the north side of the channel, about $1\frac{1}{2}$ miles eastward of Ivantakut island, is low, wooded, and clean on the southern side.

Buoy.—A black can buoy, marking the northern side of the channel, is moored half a mile south-eastward of Dabun island.

Santa Rita island (*Lat. 11° 26' N., Long. 124° 57' E.*), lying on the north side of the northern entrance to San Juanico strait, is small, high, and clean on the south side, but surrounded on the other sides by a reef which extends furthest to the westward. The island may be recognised by a fort and houses on it.

Tides.—It is high water, full and change, at Santa Rita, at 11h. 28m.; springs rise $4\frac{1}{4}$ feet.

Chart 2578, E. part of Sulu or Mindoro sea.

EAST COAST of LEITE.—From Vigia point, at the entrance of San Pedro bay, the coast trends southward for about 20 miles, and then east-south-eastward for 6 miles to Taytay point. All this tract of coast consists of sandy beaches with a moderate depth of water off them, and shoal water extends off half a mile in places; there are many rivers, and several towns standing along the shore. The country inland is level and covered with dense wood, interspersed with cocoanut plantations and rice fields. The principal towns are Tolosa, Dulag, and Abuyog.

Abuyog is a telegraph station, and is connected with Dulag by telephone.

Taytay point (*Lat. 10° 42' N., Long. 125° 7' E.*) is clean and steep-to.

Jinatungan point (Hirigatungan) lies 9 miles south-east of Taytay point, and is bordered by a reef which extends out half a mile. A rocky islet and several rocks lie from one to 2 miles southward of the point and from half a mile to $1\frac{1}{4}$ miles from the shore.

Hinunangan bay, 11 miles south of Jinatungan point, has a depth of 15 fathoms in the middle and $5\frac{1}{2}$ fathoms off the small town of Hinunangan, which stands on the left bank of the Malaga river, at the head of the bay. The two Kabugan islands lie in the northern part of the bay, separated from the main coast (which is sandy) by a channel one mile wide and from 10 to 26 fathoms deep.

General charts 2577, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

Hinondayan bay, 2 miles southward of Patyakan point, the south entrance point of Hinunangan bay, is small and exposed to easterly winds. A rocky ledge, behind which boats can discharge even when the sea is heavy, juts out from the beach in the southern part of the bay. This rocky ledge extends in a north-easterly direction, and at a short distance from the shore is covered by from $2\frac{1}{2}$ to 3 fathoms. Steamers drawing more than 10 feet should keep on the north side of the bay when entering, passing about a quarter of a mile from Pandan point.

Anchorage may be found in 4 fathoms, sand, with Pandan point bearing N.N.E., distant about three-quarters of a mile.

Coast.—From Hinondayan bay the coast trends southward for 6 miles to Malagusan point, a rounded headland formed by the eastern slopes of Mount Kabalian, which is 3,130 feet high. It then turns abruptly to the west for $5\frac{1}{2}$ miles, and then southward for another $5\frac{1}{2}$ miles to the entrance of Panaon strait. The small open coastwise port of Kabalian is situated about 4 miles westward of Malagusan point. All this part of the coast is high and clean, with deep water in the vicinity, but is exposed to the open sea.

Panaon strait and island, Surigao strait, and the islands off the north-east coast of Mindanao are described in Chapter VII.

NORTH-EAST COAST of MINDANAO.—Surigao town and Bilanbilan have already been described (page 418, 419). From the east point of the bay eastward of Bilanbilan the coast trends almost S.E. by E. for 30 miles to Tugas point, and is indented by numerous bays; the shore is covered by mangroves, and has several small towns and villages along it. Placer is a small town situated on the coast about 3 miles southward of Kabsugan island. It is reported to have a good harbour and a pier with 10 feet of water at its end at low tide.

Tugas point (*Lat. 9° 29' N., Long. 125° 57' E.*) is a narrow tongue of land stretching 2 miles to the north-east. The channel between it and Bukas island is $4\frac{1}{2}$ miles wide, and has a depth of 41 fathoms in the middle. The land in the vicinity is commanded by Mount Legazpi, 3,889 feet high, at the northern end of the great range that runs parallel to the east coast of Mindanao.

Ballena (Whale) rock, 7 miles east of Tugas point, when seen from the northward appears like two rocks; it is 5 yards in extent and 5 feet above water; a reef extends half a mile south-west from the rock.

General island is the largest and highest of a group consisting of three islands and several rocks lying off Kapunuyupugan point,

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 10' E.

5 miles south-east of Tugas point. It is separated from the point by a deep and narrow channel, and is surrounded by a reef which shows several rocks above water, and includes Triton rocks and Aukwi islet, 2 miles to the south-east. There is a small deep indentation on the south side, where good protected anchorage may be found in a depth of 13 or 14 fathoms. The shape of General island, as charted, is reported to be erroneous. Unamao islet, 2 miles south of General island, is united to the coast by a reef; between the two islands there is an isolated rocky shoal.

Kantilan reef, before the river and town of the same name 5 miles south of Kapunuypugan point, extends 2 miles from the shore; the end of the reef is in line with Unamao islet and Kapunuy-pugan point.

Kauit point (*Lat. 9° 18' N., Long. 126° 13' E.*), 20 miles S.E. by E. of Tugas point, is the extremity of a long promontory extending north-eastward, a spur of the eastern mountain chain of Mindanao. From the northward it appears bluff, but from the south-eastward it makes like two islands. It is clean and steep to westward, but it is reported that a reef reaches out 5 miles north-eastward. Masters of coasting steamers report that there is a good channel between Kauit point and the reefs shown on the chart extending north-eastward from it, and that the point may be safely rounded at a distance of 2 miles. The open bay between General island and Kauit point has not been sounded, but it appears clear and deep. The coast reef, with a breadth of from one to 1½ miles, continues to the southward from Kauit point for the distance of about 10 miles.

Tidal stream.—The ebb stream from Surigao strait is said to follow round Kauit point to the southward.

EAST COAST OF MINDANAO runs nearly north and south for a length of about 185 miles from Kauit point to Cape San Agustin, and forms several bays open to the north-east, east, and south-east. A great chain of mountains runs parallel to the coast and near to it. The coast is imperfectly known, and too great reliance must not be placed on the charts.

The towns of Cortes and Tigao are situated on the coast about 3½ and 15 miles respectively, south-westward of Kauit point.

Tandag point, shown on the chart as lying 17 miles S. 7° W. from Kauit point, is bordered by reef to the distance of 2 cables. Two islands lie close northward of the point. The town of Tandag lies on the western side of the point near the mouth of the river of the same name. **Makangani island**, 5 miles N. 36° E. of Tandag point, is clean; two rocky islets lie off its northern end.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

Arangasa island (Lat. $8^{\circ} 45' N.$, Long. $126^{\circ} 22' E.$).—From Tandag point the coast trends south-south-eastward for $19\frac{1}{2}$ miles as far as Umanun point. The town of Tago lies about $3\frac{1}{2}$ miles south-east of Tandag point. Magabao island lies close to the shore midway between Tandag and Umanun points. The coast for 9 miles south-east of Tandag point is bordered by a reef one mile wide, as charted. North of Umanun point is the island Arangasa, separated from the main coast by a narrow channel closed by reefs, which extend nearly 4 miles east and south-east of the island.

Lianga bay.—From Umanun point, southward, the coast is foul for 10 miles nearly to Jobo point, the reef projecting 2 miles out and enclosing the islet Ayninan. The village of Oteiza lies north-westward of Jobo point. Lianga bay is formed between Jobo and Bankulin points, Lianga town being at the bottom of the bay. The chart shows a shoal in the fairway leading to the town, but gives no soundings. Jobo islet lies about 2 miles south-westward of Jobo point. Kabgan islet lies near the southern shore of the bay.

Mr. Leney, Lloyd's agent at Iloilo in 1878, says of Lianga bay: "The best anchorage is off the convent in a depth of 15 fathoms. A heavy anchor should be used, as the land winds are strong. The river marked on the chart as flowing at the head of Lianga bay, is only a shallow creek. The coast here is rocky, and landing after dark is difficult. Supplies of fresh water, buffaloes, and rice can be had, but no vegetables."

It is reported that Lianga bay is very erroneously charted, and that it extends much farther westward than shown.

The coast, which trends southward for 14 miles from Bankulin point to Bislig point, is very foul, and bordered by islets and dangerous sandbanks, which uncover at low water. Singag island and several islets lie eastward of Bankulin point. The town of Hinatuan is situated on the right bank of a river about 12 miles south of Bankulin point, and is fronted by Tigdos and other islets, which are surrounded by a reef. Supplies of buffaloes and rice can be obtained at Hinatuan, but very little fresh water.

Bislig bay and town.—Bislig bay is included between Bislig point and Sanko point, lying about 6 miles south-east, and is about 6 miles deep. Masahuron island, about one mile eastward of Bislig point, on the northern side of the entrance to the bay, is surrounded by shoals which extend half a mile east and west of the island. In the passage south of the island there are several rocky shoals very steep-to, with deep water around them. In the western part of the bay is a small islet named Agonoy. The southern shore of Bislig bay is clean;

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

the northern shore, on the contrary, is foul, and should not be approached within 6 cables.

Bislig town is at the head of the bay on the right bank of a river; the bar at the mouth of this river has a depth of 2 feet on it at low water and 8 feet at high water.

The anchorage before the town, in a depth of $3\frac{1}{2}$ fathoms, sand and mud, is completely sheltered from all winds. Fresh water, buffaloes, and rice can be obtained at Bislig, but no vegetables.

Caution.—If without a pilot in approaching the coast of Bislig bay, do not come into a depth of less than 6 fathoms, as the water shoals rapidly. The channel for boats and lorchas is generally marked by bushes or stakes.

The coast.—A reef extends $1\frac{1}{2}$ miles out eastward and $5\frac{1}{2}$ miles south-eastward from Sanko point (*Lat. 8° 11' N., Long. 126° 27' E.*), the southern point of Bislig bay. The indentation in the coast, from this point for 9 miles to the southward as far as Tambog point, is filled by reefs. South of Tambog point, between that point and Katarman point, there is a great reef which forms with the main coast a small but safe port; the narrow channel leading to it should not be taken without a pilot.

South of Katarman point there is a great bank that dries; at the edge of this bank there is a depth of $3\frac{3}{4}$ fathoms, and southward of it there are two islets surrounded by rocks.

Kabugao island is situated about 4 miles southward of Katarman point. It is high on the eastern end and low on the western, and is surrounded by a reef which extends about three-quarters of a mile north-north-eastward.

The village of Boston lies at the head of the bay, westward of Kabugao island, and is not visible from the sea. This bay is reported to be foul.

Anchorage may be found in 9 fathoms, north-westward of Kabugao island, midway between it and the shore.

Tonkil point, 3 miles south-eastward of Kabugao island, has a shoal of sand projecting three-quarters of a mile north-west from it. From the Katel river, south of Tonkil point, the coast trends south-eastward for a distance of about 13 miles, as far as Bagoso point.

Bagoso point is high and wooded; when seen at a distance it appears like an island. The river and town of Kinablangan are said to lie on the south side of the point, but as charted, lie on the western side of a bay situated westward of the point. There is anchorage off the coast in a depth of 8 fathoms, but it scarcely merits the name of an anchorage, being quite open and exposed. The river can be entered by boats only.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 20' E.

A reef, the existence of which is doubtful, is shown as extending several miles south-eastward from Bagoso point.

Baganga bay (*Lat. 7° 32' N., Long. 126° 34' E.*), between Lambahon and Lacud points, offers good anchorage during the south-west monsoon, in a depth of 5 or 6 fathoms, sand, off the town, a reef which projects from Lacud point giving shelter from the east and south-east; but during the N.E. monsoon the anchorage is quite untenable at times on account of the heavy sea which sets in; when this occurs, fairly protected anchorage can be found south-westward of Lambahon point, in 5 or 6 fathoms.

Both entrance points are surrounded by reefs visible at low water, to a distance of a quarter of a mile.

The town of Baganga lies at the mouth of the river of the same name, on the western side of the bay.

Fresh water may be obtained from the river, but it can only be entered at high water; also from a small stream in the north-west part of the bay.

Daguit island is connected with the eastern side of Lacud point by a reef, and consists of white sand covered by low wood. A shoal of $4\frac{1}{2}$ fathoms lies off it on the east side.

From Lacud point the coast trends southward for 13 miles as far as the northern entrance point of Karaga bay, and presents low points and some small rivers. A few villages of slight importance stand on the shore.

Charts 2578, 2575.

Karaga bay, between Alisud (Sankol) and Pusan points, is semi-circular in form, open to the eastward, and penetrates about 2 miles inland.

Alisud, the northern entrance point, is low; a rocky shoal, covered by $1\frac{3}{4}$ fathoms water, projects a mile eastward from it.

The town of Karaga stands on the north shore of the bay. The bottom before the town is reported to be foul; the best anchorage is off the western end of the town. There is also anchorage off the town of San Jose, on the south side, sheltered from southerly winds.

Pusan point is low, and formed of cavernous rocks; it is clean, and may be rounded at the distance of a cable. The current begins to be strongly felt off this point, and at spring tides violent eddies are produced, raising a high sea.

Chart 2575, Eastern part of the Celébes sea.

Dalonan Manaol (Bunga) point, $4\frac{1}{2}$ miles southward of Pusan, is the first point which is not mountainous met on coming northward from Cape San Agustin. There is a bay south of the point, on

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

the shore of which stands the village of Manay; anchorage may be taken up close to the shore with the church bearing N. 27° W.

Kasauman (Buan) point (*Lat. 7° 3' N., Long. 126° 33' E.*), 7 miles southward of Bunga point, is sandy, with a narrow reef off it. There is a small river here where boats can water.

Maglubun point, stated to lie 4 miles S. by W. of the last point, is clean and projecting, and easy to recognise; it is not shown on the chart. Several villages stand on this part of the coast, which is clean and wooded, but beaten by the sea. The village of Mamponon is near a small river, but there is too much sea on the coast for anchorage.

Mayo bay, between Tugubun point, 8 miles south-south-west of Kasauman point, as charted, and Lamigan point, is a large bay over 5 miles wide at the entrance between these two points, and penetrating 5 miles to the westward; it is but little known. Tugubun point is hilly and wooded; a shoal of sand-rock projects one cable from it. Lucutan (Yucatan) anchorage is on the north shore, 2 miles west of Tugubun point. Flaca and Gorda points, west of Lucutan, are formed by hills which terminate in low points; a reef extends 2 miles out from Gorda point, and Bobon point, on the south shore, near the entrance, is shown as surrounded by a reef one mile wide.

Plan 415, Pujada bay.

PUJADA BAY, separated from Mayo bay by the long peninsula of Guangan, which terminates in Lamigan point, would be the best harbour in Mindanao were it not for its great depth of water. The bay is about 4 miles wide at the entrance, increasing to 6 inside, and extends about 11 miles north-north-westward; at the head of the bay there are anchorage depths of from 10 to 20 fathoms.

The shores of the bay abound in good timber, such as *Alintato*, an ebony; *Molavi*, a teak; *Camunu*, *connarus santaloides*, useful as a cabinet-makers' wood; and cedar. Cacao, coffee, and tapioca are cultivated; mastic of good quality, wax, and honey are plentiful; deer and mountain hog abound.

Lamigan point (Taukauan), north-eastward of the entrance of the bay, is said to be clean to seaward, but fringed westward by reef as far as Taganilap point.

Pujada island, 558 feet high, divides the entrance into two channels; of these, the south-western, nearly $1\frac{1}{4}$ miles in width, appears to be clear. A reef, over half a mile wide, extends $2\frac{1}{2}$ miles in an E. by S. direction from the south side of Pujada island, and near its

General charts 2575, 943, 1263.

Plan 415, Pujada bay. Var. 1° 30' E.

end is a flat-topped rock; the sea breaks on this reef even at high water.

The north-eastern channel lies between Pujada island and the shore reef of Guanguan peninsula, and further in between the north end of Pujada and a reef extending southward from Uanivan islet lying off the eastern shore of the bay; this channel is also nearly $1\frac{1}{2}$ miles wide, and appears to be clear, being reported so by regular traders.

Uanivan islet, lying just inside the north-eastern entrance, about $1\frac{1}{2}$ miles northward of Pujada island, is small and high. It is clean on the northern side, but a reef extends from the south side in a south-west, south, and south-east direction for about 4 cables. A depth of 5 fathoms, sand and coral, is reported in the channel between Uanivan and Taganilao point.

Dangers.—The coast on the east side of Pujada bay is foul from Likok point to Mati, a distance of 5 miles; northward of Likok point, a broad rocky flat covered only by $1\frac{1}{2}$ feet water extends out for a mile. This shoal faces an inlet which penetrates within 40 yards of Mayo bay. The natives haul their canoes across this neck of land, and launch them in Mayo bay. Maboia point, at the mouth of the Matiao river, on the north side of the bay, has a reef awash extending about 6 cables south-south-westward. At a distance of one mile south-south-east from Maboia point, is a small circular rocky shoal with $1\frac{1}{2}$ feet on it.

Mati (*Lat. 6° 56' N., Long. 126° 14' E.*), at the head of Pujada bay, is a small and unimportant town, standing in a wide prairie land, surrounded by picturesque scenery; the shore near it is steep-to. Good water is obtainable, but provisions are scarce. Steamers from Samboanga and Palak trade to Mati.

Anchorage.—There is anchorage off the town, near the shore, in a depth of 15 fathoms, with the pier head bearing N. 27° W., distant about $1\frac{1}{2}$ cables.

Light.—A *red fixed* light, elevated 36 feet above high water, and visible 7 miles in clear weather, is exhibited from a white frame structure, 34 feet high, erected on the beach about 100 feet eastward from the pier at Mati.

Port Balete.—There is an indentation 2 miles deep on the west side of Pujada bay, about 5 miles from Mati, called Balete; the entrance, with a depth of from $3\frac{3}{4}$ to $4\frac{1}{4}$ fathoms, is reduced by reefs to a width of $1\frac{1}{2}$ cables. Good anchorage may be found inside for small vessels, in from 6 to 16 fathoms, but reefs extend from one to $3\frac{1}{2}$ cables from the shores of the port. Outside the entrance the water is too deep for anchorage.

General charts 2575, 943, 1263.

Plan 415, Pujada bay. Var. 1° 30' E.

Makambol point, on the west side of Pujada bay, has a reef projecting eastward from it about $2\frac{1}{2}$ cables. There are plantations of cocoanut and bananas on this part of the coast.

Anchorage.—Off Makambol village and to the southward of the reef just mentioned, there is anchorage in a depth of 8 fathoms near the shore.

Off Magun, within Tumadgo point, there is indifferent anchorage.

Tides.—In Pujada bay it is high water, full and change, at 6h.; springs rise 6 feet.

Tumadgo point, the southern point of Pujada bay, and also Alo point, a little to the southward, are peaked and clean.

Chart 2575, Eastern part of the Celébes sea.

COAST.—**Luban point**, 19 miles southward of Tumadgo point, is clean and bold; off it is Luban islet. In a small bay to the northward of the point vessels can find shelter in a depth of $5\frac{1}{2}$ fathoms during the south-west monsoon, while waiting for favourable weather to round Cape San Agustín. The coast between Pujada bay and Luban point is clean, and presents several scarped points with patches of red reeds on them. The coast between Luban point and Cape San Agustín is high and clean, with small points of sand and rock.

CAPE SAN AGUSTIN (*Lat. 6° 16' N., Long. 126° 12' E.*) is the southern extreme of the long peninsula which forms the eastern side of Davao gulf. The entire promontory is mountainous. The northern part is cut into by deep valleys, but the southern part, for 5 miles northward from the extremity of the cape, is a continuous backbone of hills running down the middle of the long narrow strip which terminates in the cape. These hills decrease gradually in height from 1,110 feet 5 miles north of the cape, to a rocky bluff 15 to 20 feet high at its extremity. The Pacific side of the cape for 2 miles is a succession of sandy beaches separated by rocky bluffs. Large vessels can find shelter in Pujada bay. *See page 641.*

A rock, 18 feet high, fringed by a reef which connects it with the land, lies 20 yards southward from the cape, and is conspicuous when seen from eastward or westward.

Reef.—About a quarter of a mile south-south-westward from Cape San Agustín is the northern end of a reef which extends three-quarters of a mile in a south-south-west direction, with a width of over a quarter of a mile. It has a least depth of $1\frac{1}{2}$ fathoms, and breaks heavily at times. There is a good channel one cable wide between the reef and the cape, which may be found by steering on an E.S.E. or

General charts 2575, 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

opposite course, so as to give the 18-foot rock a berth of about $1\frac{1}{2}$ cables. This channel should be used with caution, as the currents are strong and irregular.

Charts 2575, 2578.

CURRENTS on the EAST COAST of MINDANAO.

—A constant current to the south has been observed on this coast, especially at a distance beyond 4 miles from the shore; within this distance the tides preserve their influence in some places, but near the projecting points the current remains constant. To the northward of Mayo bay, this current shows itself in strong races which increase in force on approaching Pusan point (*Lat. 7° 15' N., Long. 126° 37' E.*), where they attain their greatest strength. They are very violent off Lacud point, and also off Lambahon and Bagoso points. In order to lessen the effect of the current, a vessel should keep at a good distance from the shore. Near the coast the sea is always very rough and choppy, and vessels suffer a good deal from it.

General charts 943, 1263.

CHAPTER XI.

CELÉBES SEA, BASILAN STRAIT TO MOLUCCA PASSAGE.

VARIATION IN 1911.—Increasing about one minute annually.

Charts 2576, 2578. Var. 1° 30' E.

SOUTH COAST of MINDANAO.—Sibuguey bay.—

From the north-east entrance of Port Masingluk the coast of Mindanao trends north-north-eastward for about 50 miles, and then, after curving round to the eastward for about 10 miles, trends southward for about 30 miles, and forms Sibuguey bay, terminated to the south-east by Lutangan island off the southern extremity of Olutanga island. This extensive bay is about 30 miles long in a north and south direction, and varies in width from 33 miles abreast of Olutanga island to 16 miles at Buluan island. There are no ports of any importance in this bay; at present it is little used by shipping.

Depths.—The depths in Sibuguey bay are generally under 60 fathoms northward of the shoals in the centre part of the entrance. Southward of the parallel of Bagolibud point the depths are irregular; besides the shoals specially mentioned there are several banks of coral with depths of from 13 to 25 fathoms on them, surrounded by considerably deeper water. Northward of the parallel just mentioned, the depths are regular; from 38 fathoms in the centre of the bay on that parallel, they decrease fairly regularly to the shores. The 10-fathoms line is nowhere more than $1\frac{1}{4}$ miles from the shore, except in the bays and on the eastern side, where shoals extend several miles from the land.

The bottom is generally sand in the western part of the bay, with mud and coral in places; mud at the northern end, and also generally on the eastern side of the bay north of the parallel of Port Banga (*Lat. 7° 30' N., Long. 122° 26' E.*). Farther south, on the east side, the bottom consists of mud, sand, and coral.

Chart 2576, Sulu archipelago.

West shore.—From the northern entrance to Port Masingluk the coast trends north-north-eastward for 25 miles to Vitali point. This stretch of coast is very irregular, being indented by small bays, most of which are foul and of no importance to navigation. It is cut

General charts 943, 1263.

Chart 2576, Sulu archipelago. Var. 1° 30' E.

into by a number of small streams, none of which are navigable, and there are several small villages scattered along the shore.

It is fringed by coral reefs in places and faced by a number of small islands, most of which are clear on their seaward sides. This part of the coast can be safely navigated by keeping one mile outside the islands and outlying points.

Malasugat point, about 5 miles north-north-eastward from the northern entrance to Port Masingluk, is low, wooded, and fringed by a narrow reef. Malasugat bay, a slight indentation in the coast south-westward of the point of the same name has depths of from $3\frac{1}{2}$ to 7 fathoms, but is nearly blocked by reefs.

Shoal.—There is a small dangerous one-fathom patch about $1\frac{1}{2}$ miles southward from Malasugat point and about one mile off-shore.

Panubigan islands (*Lat. 7° 9' N., Long. 122° 16' E.*) consist of some 20 small islands and rocks lying off the coast of Mindanao, between Malasugat point and Lawigan point $6\frac{3}{4}$ miles northward; none of them are over 2 miles from the shore. They are generally high and well wooded, and do not require any detailed description. Sheltered anchorage may be found among them.

Chart 2578, E. part of Sulu or Mindoro sea.

Coast.—From Lawigan point the coast trends northward about $5\frac{1}{4}$ miles to Bluff point, and is indented by a number of small bays mostly blocked by coral.

Mount Taguite is a conspicuous hill rising abruptly from sea level to a height of 1,400 feet, and is situated about half a mile from the shore at one mile northward of Bluff point. It is entirely wooded, and has steep, symmetrical slopes with a smoothly-rounded dome-shaped top. It is the only hill near the coast in this vicinity.

Taguite bay.—From Bluff point the coast trends northward for $3\frac{1}{2}$ miles, and then south-eastward in a very irregular line for over 2 miles, forming Taguite bay. This bay is $2\frac{3}{4}$ miles wide between Bluff and Taguite points, and extends about the same distance northward. Taguite island, lying in the middle of the bay, is half a mile in extent, 217 feet high and wooded. The bay is shoal, and of no value to navigation. Off the entrance the depths are from $4\frac{1}{2}$ to 8 fathoms.

Vitali point lies $6\frac{1}{2}$ miles north-eastward of Taguite point. This stretch of coast is heavily wooded from the inner edge of the mangroves as far as can be seen, except near Vitali point; here the low foot-hills are covered with rank grass. All the hills as far back as can be seen are heavily wooded to their summits. This part of the

General charts 943, 1263.

Chart 2578, Eastern part of Sulu or Mindoro sea. Var. 1° 30' E.

coast is fringed by a narrow steep-to coral reef. A rocky patch of 8 fathoms lies 2 miles east-north-eastward of Taguite point and 7 cables off-shore. About $1\frac{1}{2}$ miles south-westward from Vitali point there is a small low wooded islet lying close to the shore on the shore reef.

Rock.—A rock awash, surrounded by deep water, lies about 6 cables S.S.E. from Vitali point.

Tigbaon islets (*Lat. 7° 22' N., Long. 122° 25' E.*) are a group of five islets and one rock lying eastward and south-eastward from Vitali point. Tigburacao, the south-easternmost, is $1\frac{1}{2}$ cables long east and west and 150 yards broad, and lies nearly $3\frac{3}{4}$ miles south-eastward from Vitali point; it is low, flat, heavily wooded, and is fringed by a narrow reef, widest at the western part; shoal water extends a quarter of a mile west-south-west from the islet. At about half a cable south-eastward from the islet are two large pinnacle rocks, the higher of which rises to a height of 40 feet; these rocks are conspicuous, and can be seen from a considerable distance; when viewed from the eastward they appear as one.

White rock, 4 feet high, is situated over half a mile west-south-westward of Tigburacao islet; it stands on a small coral reef, surrounded by deep water.

Gatusan islets lie about 2 miles south-south-eastward of Vitali point; they are both about $1\frac{1}{2}$ cables long north and south, less than half that distance broad, and are wooded and fringed with rocks. The northern islet is less than 50 feet high, while the southern is 117 feet.

Bakungan islet, the largest of the group, lies 2 miles East from Vitali point; it is $2\frac{1}{4}$ cables long north-east and south-west and $1\frac{1}{2}$ cables broad. The shores are fairly bold, and the land rises sharply to a height of 211 feet. A large umbrella-shaped tree on the summit can be seen from a considerable distance. About 4 cables south-westward from Bakungan is a rock awash; the channel between the rock and the islet is deep and clear. Between Bakungan and Gatusan islands are two patches of 7 fathoms.

Lampinigan islet, a little over half a mile N. 58° E. from Vitali point is nearly round, about one cable in extent, wooded, and 192 feet high. On the south and east sides, rocks, dry at low water, extend 50 or 60 yards. The channel between the islet and Vitali point has a least depth of $2\frac{3}{4}$ fathoms. Lampinigan islet, seen from the southward, appears like a cone with a steep slope on the eastern side and a gradual rise on the western.

A small shoal with a least depth of $2\frac{1}{4}$ fathoms lies three-quarters of a mile East of Lampinigan islet.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Coast.—From Vitali point the coast trends westward, then northward and eastward to Linguisan point, forming Tunganan bay. Near the coast are numerous hills from 100 to 200 feet in height separated by winding valleys; behind these the land rises in a series of hills to the mountains in the interior. Sharp peak, 750 feet high, lies $5\frac{1}{4}$ miles N. 75° W. from Vitali point.

Tunganan bay is a nearly semicircular indentation between Vitali and Linguisan points. It is about 7 miles wide at the entrance, and extends some 3 miles westward. The depths in the entrance are from 12 to 15 fathoms, whence they decrease gradually towards the western shore, where there are extensive mud-flats. Nearly the whole bay has a mud bottom, but in the north-western part, where the depth is over 10 fathoms, the bottom is sand. There is good anchorage in 10 fathoms, mud, anywhere in Tunganan bay on a line northward from Basan reef, except at the northern part, where the depths are slightly greater.

Kabog and Kamugan, two small wooded islets, little more than 50 feet in height, and a very small wooded islet, 20 feet high, lie on the same reef about $1\frac{1}{2}$ miles north-westward from Vitali point.

Basan reef (*Lat. $7^{\circ} 25' N.$, Long. $122^{\circ} 23' E.$*), a dangerous detached coral reef, nearly half a mile in extent, lies 2 miles N. 10° W. from Vitali point. This reef, part of which dries at half-tide, is the only danger on the south side of the entrance to Tunganan bay. Banks of white sand have formed on the two highest parts of the reef, and are visible from a considerable distance except at extreme high water. The north and east sides of the reef are steep-to, and may be approached with safety, but the south and west sides are foul. The water deepens rapidly east and south of Basan reef.

Tigbukay bay extends about one mile north-eastward from the northern part of Tunganan bay. The southern part is apparently deep and clear, but the northern part is shoal. The entrance is 3 cables wide with a depth of 7 fathoms, between Tigbukay point, and the shoal water extending from the western entrance point. It is of comparatively little importance, lying as it does immediately westward of the fine harbour of Port Banga.

Bangaan island lies between Tigbukay and Linguisan points, the western and eastern entrance points of Port Banga. It is about $6\frac{1}{2}$ cables long in a north-east and south-west direction, has a greatest width of a quarter of a mile, and is 160 feet high. It is sparsely wooded on the slopes, grassy on the high land. It is clean and steep to on the northern side, but foul on the south-eastern side to a dis-

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

tance of 3 cables, and on the southern part of the western side. A rocky ledge extends over 4 cables south-westward from the south-west end of the island. From a point 90 yards off the north-eastern point a line of rocks extends south-westward to a little beyond the south-west point of the island, which should be given a good berth, as the water shoals rapidly and the above-mentioned rocks are not visible at high water. A wharf has been built on the north side of the island, having a depth of 18 feet at the end. It and a sawmill near are not visible from seaward.

LIGHT.—A *red fixed* light, visible 7 miles in clear weather, is exhibited at an elevation of 104 feet above high water, from a wooden frame structure 20 feet high erected on the northern part of Bangaan island.

Port Banga (*Lat. 7° 30' N., Long. 122° 26' E.*), opening from the northern part of Tunganan bay, is 2 miles wide at the entrance and extends about 4 miles north-eastward. It affords good anchorage in 2 to 11 fathoms, perfectly protected from all winds, for vessels of any size. Bangaan island divides the entrance into two good channels, about half a mile and a quarter of a mile wide, respectively, the eastern channel being the wider, and the port is navigable for upwards of 2 miles from the entrance for large vessels and for very small craft nearly to its head. Along the north-west shore of the port, north-westward of a north-east and south-west line from the east side of Lapinigan island, there is foul ground with bare coral patches north-eastward of the island, and coral extending a short distance off the points south-westward of it.

Lapinigan island, 106 feet high, small and heavily wooded, lies a quarter of a mile off-shore on the north-western side of the port, 1½ miles above Bangaan island.

Danger.—On the south-east side of the port there is a detached coral patch with a least depth of 3 feet on it at low water. It lies about a quarter of a mile off-shore, and about half a mile S.S.E. from the centre of Lapinigan island; a reef and shoal water extend from one to 2 cables from the south-east shore of the port.

Linguisan point, the eastern entrance point of Port Banga, is low and wooded. Surrounding the point and eastward from it along the south shore of the peninsula, which forms the eastern side of the port, is a coral shelf, partly dry at low water, and over a quarter of a mile wide. The extreme eastern limit of this shelf extends a little farther out, and is marked by rocks above high water, and shoal water extends nearly 1½ cables southward of the reef. Small shoal patches of 4 and 4½ fathoms lie 3¼ and 4¼ cables respectively

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

from Linguisan point towards the north side of Bangaan island. The outer patch of 4 fathoms being 3 cables distant from the north-east point of the island.

Reef (*Lat. 7° 29' N., Long. 122° 28' E.*).—A small dangerous detached reef, dry at low water springs, and surrounded by deep water, lies nearly one mile south-eastward from the south-east point of the peninsula between Port Banga and Sibuguey bay. From its southern edge, the north-east point of Bangaan island, bears N. 79° W., distant nearly $2\frac{1}{2}$ miles. Buluan island open of the coast leads eastward of the reef.

Directions.—To enter Port Banga by the western channel, give the south-west point of Bangaan island a berth of at least half a mile, and when the channel is well open and Lapinigan island beginning to be shut in by the point on the west side of the port, head up the channel with that point a little on the starboard bow, keeping towards the western shore. Avoid the north-west point of Bangaan island, and when clear of it haul eastward and then north-eastward, and proceed up the middle of the port, anchoring anywhere between Bangaan island, and a line drawn eastward from Lapinigan island, in 11 to 7 fathoms, mud.

To enter by the east channel, bring the north-east point of Bangaan to bear W.N.W. before Buluan island is shut in by the land, and steer for the point; when drawing near it haul off to give it a berth of from one to $1\frac{1}{2}$ cables, and when the west channel begins to open steer north-eastward for the middle of the port, and anchor as previously directed.

Coast.—From Linguisan point the coast trends eastward for one mile and then north-eastward for $5\frac{1}{2}$ miles to Bagolibud point at the entrance to Busan bay, forming a peninsula between Port Banga and Sibuguey bay. The shore is well defined by cliffy points with sandy beaches in the indentations between them. The southern part of the peninsula is covered with kogon grass and a few scattered trees. On the northern part are wooded hills, rising to 465 feet, the north-eastern of which is 183 feet high, and forms the summit of Bagolibud point. This portion of coast is fringed by a narrow strip of coral, and the only detached danger besides the reef previously mentioned is a patch of 3 feet water, lying about $1\frac{1}{4}$ miles southward of Bagolibud point, mentioned on the next page.

Panabulan islet, situated 3 miles south-westward of Bagolibud point, is 75 feet high, very small, and surrounded by a reef which connects it with the land, about $1\frac{1}{2}$ cables distant.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Loklabuan bay, about half a mile in extent, lies $1\frac{1}{2}$ miles south-westward of Bagolibud point. On the northern side of the bay is a prominent thickly-wooded hill.

Shoal.—A small shoal, with a least depth of 3 feet on it, lies $1\frac{1}{4}$ miles S. 5° W. from Bagolibud point, and 4 cables off the northern entrance point of Loklabuan bay.

Bagolibud point (*Lat. $7^{\circ} 35' N.$, Long. $122^{\circ} 30' E.$*), the southern entrance point of Busan bay, is a thickly-wooded narrow neck of land extending in a north-east direction. Foul ground extends a quarter of a mile eastward from the point, and the north side is fringed by a reef and lined with mangroves.

About one cable northward from the point are the Tatal rocks, a cluster of rocks from 10 to 13 feet high, connected with the land by a reef, dry at low water. These rocks are very conspicuous when seen from seaward. Padugan islet, one-third of a mile westward from Bagolibud point, lies on the outer edge of the shore reef that dries at low water. It is $1\frac{1}{2}$ cables from the shore, very small, and 20 feet high. Padugan islet and the Tatal rocks mark the limit of the dangers northward from Bagolibud point.

Busan bay.—From Bagolibud point the coast trends westward for $4\frac{1}{4}$ miles, and then turns sharply north-eastward for 9 miles to Laboyoan point, which is distant 7 miles N. 8° E. from Bagolibud point, forming Busan bay. Tupilak hill is the most conspicuous feature in the vicinity of the bay; it stands $1\frac{3}{4}$ miles back from the coast on the bearing of S. 84° W. from the summit of Buluan island. It is a conical grassy hill, 517 feet high, and having a wooded background can be seen from a considerable distance seaward. Three other grassy hills lie south-westward of Tupilak, and numerous low hills with grassy slopes lie around the south-west shore of the bay. These hills are separated from the higher and more distant hills in the interior by a valley leading inland in a westerly direction from Kalug point. A similar valley extends from the southern shore of Busan bay to Port Banga.

Lalim point, about $1\frac{1}{4}$ miles westward from Padugan islet, is fringed by reefs extending a quarter of a mile northward. The south-west corner of Busan bay is entirely closed by coral reefs, awash at low water; between the eastern limit of these reefs and Lalim point there is good anchorage in 6 or 7 fathoms, mud.

Kalug point, about $3\frac{1}{2}$ miles north-north-westward of Bagolibud point, extends in an easterly direction, and is low and narrow. A coral reef awash at low water, except at the outer end, projects about half a mile south-eastward from the point.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Laboyoan point (*Lat. 7° 42' N., Long. 122° 31' E.*), forming the north-eastern limit of Busan bay, is a mangrove point, and marks the position of the mouths of two small rivers. It is surrounded by coral reefs, which extend over half a mile off.

Islets.—**Diligan islet**, lying about $1\frac{1}{4}$ miles north-westward from Bagolibud point is low and thickly wooded. It is about a quarter of a mile long east and west, half that distance broad, and is surrounded by a narrow reef, steep except on the east side, where a shoal with a depth of 3 fathoms extends off 2 cables. The islet may be rounded safely at the distance of one-third of a mile.

Saduk islet is a clump of mangroves growing on the reef in the south-west part of the bay, about 3 cables from the shore.

Anchorage, with good holding ground, may be found anywhere in Busan bay; westward of Diligan island the depth is 11 fathoms, decreasing gradually westward to the edge of the reef.

Mount Silingan, situated $4\frac{1}{2}$ miles north-westward from Laboyoan point is a conspicuous landmark from all parts of Sibuguey bay. It has three prominent peaks and another one rising from its northern shoulder. The central and highest peak, named Kipit, has an elevation of 2,842 feet.

Buluan island, the largest island in the northern part of Sibuguey bay, is about half a mile long north-west and south-east, and rises in the south-east part to a sharp thickly-wooded peak, 324 feet high. It lies about $6\frac{3}{4}$ miles north-north-eastward from Bagolibud point, and about 9 cables east-south-eastward of Laboyoan point, from which it is separated by a navigable channel a quarter of a mile wide, with a depth of 7 fathoms in the middle. The eastern, southern, and south-western sides of the island are fringed with coral, dry at low water, and at $1\frac{1}{4}$ cables south-eastward from the island are rocks awash at high water, with shoal water extending a quarter of a mile further. The water is deep close to the reefs on all sides, except the south-eastern, which should be given a berth of at least half a mile.

The 5-fathoms line off Laboyoan point extends to a distance of 4 cables westward from Buluan island.

Coast.—From Laboyoan point the coast trends about $4\frac{1}{2}$ miles north-eastward, with a curve to the north-west, to Madiap point. Buluan river discharges about $1\frac{1}{4}$ miles north-north-eastward from Laboyoan point; the village of the same name lies on the south side of the entrance. Kaparan village is on a low islet in the midst of mangroves about 3 miles north-eastward of Laboyoan point; a white sand beach marks the south side of this islet.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Madiaop point projects in a south-east direction, and is fringed by a narrow belt of mangroves, which are protected by numerous rocks awash at low water.

Saro point, $1\frac{1}{2}$ miles east-north-eastward from Madiaop point, consists of low cliffs, and marks the eastern limit of the low irregular grass-covered hills which extend in a south-west direction towards Madiaop point.

Bakalan point (*Lat. $7^{\circ} 45'$ N., Long. $122^{\circ} 37'$ E.*), about $1\frac{1}{2}$ miles east-north-eastward from Saro point, extends about half a mile in a south-east direction. The southern extreme of the point is composed of low cliffs, while a gravel beach outlines the eastern part. The point is slightly over 100 feet high, covered with a thick growth of light timber (one of the trees is conspicuous) and brushwood, and is in reality an island, being connected with the mainland by an extensive mangrove swamp.

Between Bakalan point and Taynabo point, 3 miles eastward, is a bay one mile deep towards the north, nearly filled with mud-flats, dry at low water. The head of the bay is lined with mangroves, and several small streams empty into it. Koba islet, 20 feet high, very small and wooded, lies about 2 cables from the shore at the head of the bay; its southern side is composed of cliffs which give it a rugged appearance when seen from the southward. It is an islet at high water only, being surrounded by mud-flats at low water.

Taynabo point is the most prominent point at the head of Sibuguey bay; its southern and eastern sides are composed of cliffs about 15 feet high, while the south-eastern side is a curved sandy beach. The southern part is heavily wooded; the eastern part is covered with grass and brush, and rises to a height of 165 feet. The point is connected with the mainland by a narrow neck of mangroves similar to Bakalan point.

Between Taynabo point and Tikauan point, about $4\frac{1}{2}$ miles E. by S. from it, is a bay somewhat larger than the bay westward of Taynabo point. Tando and Banco points project southward from the head of the bay, dividing it into three smaller bays. Both of these points are fringed with coral, but the bays are comparatively clean. Villages lie on the shores of the two eastern bays.

Reef.—A reef less than a quarter of a mile in extent, with a least depth of a quarter of a fathom and surrounded by deep water, lies in the entrance of the bay, about $1\frac{1}{2}$ miles eastward of Taynabo point. There is a clear channel 6 cables wide and 9 fathoms deep between this reef and the reef fringing the 15-foot rock southward of Tando point.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Eastern side of Sibuguey bay.—Lutangan island (*Lat. 7° 16' N., Long. 122° 51' E.*), forms the south-eastern entrance point of Sibuguey bay. It is about three-quarters of a mile in extent, low, and heavily wooded. Its south-eastern side is composed of low cliffs and a sand-beach; the other sides are fringed with mangroves. The island is surrounded by reefs partly dry at low water, except at the eastern extremity, which is steep-to. A patch of 4 fathoms lies half a mile southward of Lutangan. The island is nearly connected with Olutanga island to the northward by a mangrove swamp. The region lying south-westward of Lutangan island, outside 2 or 3 miles from the shore, has not been thoroughly examined.

Olutanga island lies immediately southward of the peninsula forming the eastern side of Sibuguey bay. It is separated from the mainland by a broad irregularly shaped body of water extending from the eastward, and by Canalizo strait, a narrow tortuous channel which connects that body of water with Sibuguey bay. Olutanga island is of very irregular shape, and has a greatest length north and south of $9\frac{1}{2}$ miles, and is $10\frac{1}{2}$ miles wide at the widest part. The western coast is fairly regular; the south-eastern and northern sides are cut into by deep bays. The entire island is low and flat, generally fringed with mangroves, and heavily wooded in the interior. The only part of the island which rises above the general level is in the vicinity of Kangan point, on the south-east side of the island, where there is a small area rather less than 100 feet in height.

Coast.—From the southern end of Olutanga island the eastern shore of Sibuguey bay trends northward for about 29 miles, and then westward for 3 miles to Tikauan point, at the north-eastern end of the bay. Mangrove swamps extend along the coast, obscuring the shore line except at Seboto point, Bagalamatan in Taba bay, Patan point, where the mangrove belt is very narrow, and at Tayoman point. From near Seboto point to the entrance to Taba bay, the coast is foul and should be avoided by all but small craft. There are good anchorages along this coast, where shelter from all winds except those from south-west may be had, but these anchorages are not easy to approach on account of the many off-shore reefs, often not seen until close-to, and the want of natural objects suitable for marks. No directions for clearing these dangers can be given, and the chart should be referred to; see Off-lying shoals, page 658.

Seboto point, at the southern end of Olutanga island, has a white sand-beach, and is covered by heavy timber. The shore reef, partly dry at low water, extends southward for nearly $1\frac{1}{2}$ miles, and eastward, surrounding Lutangan and Silagui islands. Depths of 5 and $5\frac{1}{2}$ fathoms lie outside the southern edge of the reef at 2 miles from

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

the southern extreme of Olutanga island, and off the west end of the reef is a shoal of 3 fathoms. Vessels passing southward of Olutanga island should give Seboto point a berth of at least $2\frac{1}{2}$ miles.

Deal point.—From Seboto point the coast curves in a general north-north-west direction, for about $4\frac{1}{2}$ miles, to Deal point, which is low, heavily wooded, and fringed with a narrow belt of mangroves; it is the most conspicuous point on the west coast of Olutanga island. Thence the coast trends northward for $4\frac{1}{2}$ miles to the entrance to Canalizo strait, and is fringed with a narrow belt of mangroves, intersected by several small streams. The shore reef is nearly half a mile wide, and several detached reefs, dry at low water, lie from $1\frac{1}{2}$ to 2 miles from the shore. Lipari island, $2\frac{1}{2}$ miles southward from Canalizo strait, and 3 cables off-shore, is a small mangrove island on the eastern side of a wide reef. From the westward it appears part of the main island.

Canalizo strait is a narrow and very foul channel, navigable by very small craft only. It is about 2 miles long, and from $1\frac{1}{2}$ to $2\frac{1}{2}$ cables wide. At low water 7 feet can be carried through the strait, but the western entrance is only half a cable wide between coral heads, and is rather difficult to find.

Talaid point (*Lat. 7° 28' N., Long. 122° 47' E.*), forming the western side of Loksiko bay, extends about $1\frac{1}{2}$ miles in a south-west direction. The point is fringed with a narrow belt of mangroves, within which the land is low and heavily wooded. The point is surrounded by a reef which extends nearly one mile in a south-west direction.

Loksiko bay is about $2\frac{1}{2}$ miles wide at the entrance between Talaid point and the western entrance to Canalizo strait, and extends about 2 miles north-eastward, with depths of from 2 to 8 fathoms; its shores are lined with mangroves and fringed with coral reefs. A long reef projects south-westward from a point at the head of the bay, dividing it into two arms, which can only be used by small vessels. The main part of the bay is further obstructed by detached reefs, parts of which dry at low water. In the central part of the entrance there is a clear space one mile in extent, with depths of from 6 to 8 fathoms, mud. No directions can be given.

Labatan hill, a wooded, dome-shaped hill 440 feet high (the tops of the trees are 150 feet higher), lies near the coast about midway between Talaid and Kabog points. It is the only hill southward of Mount Sibuguey.

Pandalusan island is a small, partly-wooded island lying $5\frac{1}{2}$ miles westward of Talaid point. It is about $1\frac{1}{2}$ cables in extent, and of moderate height, the tops of the trees being

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

172 feet above the sea. A coral reef, awash at low water, extends 2 cables south-westward from the island, while another not quite awash, extends about the same distance eastward. A narrow bank, with a patch of $1\frac{1}{2}$ fathoms near the outer end, projects $1\frac{1}{2}$ miles eastward from the island.

Coast.—From Talaid point the coast trends northward for $4\frac{1}{2}$ miles to Kabog point, and is lined with mangroves and bordered by reefs, which extend to a distance of one mile in places. Beyond this reef are a number of small detached reefs.

Patan point (*Lat. 7° 36' N., Long. 122° 47' E.*), situated $2\frac{3}{4}$ miles northward of Kabog point, forms the northern entrance point of Taba bay. The detached hill forming this point is 244 feet high, and is heavily wooded except on the southern slope of the eastern part, which is covered with kogon grass. The low wooded area eastward of the hill is about 25 feet above the sea level. The western extreme of the point is fringed by a reef $1\frac{1}{2}$ cables wide; the south side is formed by low cliffs.

Taba bay.—From Patan point the coast trends south-eastward and southward for 5 miles, then westward and northward to Kabog point, forming Taba bay. The Kabog islets, about 4 cables northward of Kabog point, are small, and covered with mangroves; they lie close together on a reef, part of which dries at low water. This reef extends northward from the islets to within half a mile of Patan point, and also $1\frac{1}{2}$ miles westward from the islets. The enclosed basin, 4 miles long, with an average clear width of three-quarters of a mile, forms the best sheltered anchorage on the east side of Sibuguey bay. The shores of Taba bay are generally lined with mangroves, and the fringing reefs are very narrow; a number of small streams flow into the bay, and near its head is the small mangrove islet named Suong.

Depths.—The depth in the entrance between Patan point and the northern end of the reef extending from the Kabog islets, is from 14 to 16 fathoms, and for a distance of $1\frac{3}{4}$ miles within the entrance the depths decrease gradually from 11 to 5 fathoms. The southern half of the bay is shoal, and in the south-east part are mud-flats, dry at low water.

Dangers.—On the eastern side of the bay are two detached reefs, which lie south-eastward 8 cables and $1\frac{1}{2}$ miles, respectively, from Patan point, the former being 4 cables and the latter $2\frac{1}{2}$ cables from the shore; they, as well as the reef off Patan point, can usually be made out by the colour of the water on them. On the western side of the bay, shoal water extends from one to 3 cables eastward from the reef north of Kabog islets.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Directions.—It is comparatively easy to enter Taba bay at any time of tide, and at low water the edges of the dangers are clearly defined. To enter, pass Patan point on a S.E. course, giving the point a berth of a quarter of a mile ; when the eastern side of the Kabog islets bears S. $\frac{1}{4}$ E., steer S.S.E. or more southward, and anchor according to draught.

Bagalamatan, consisting of only 4 houses, is the principal village in Taba bay, and lies 2 miles south-eastward of Patan point, on the eastern shore. The point on which the village stands consists of low cliffs, and rises to a height of 35 feet a short distance within.

Coast.—Between Patan and Tikauan points the coast is free from off-lying dangers, but is fronted by extensive mud-flats, with deep water close to generally, and may be approached to the distance of one mile except off the mouth of the Siay river, where shoal water extends off 3 miles.

Mount Sibuguey (*Lat. 7° 36' N., Long. 122° 49' E.*), situated $1\frac{1}{2}$ miles east-north-east from Patan point, is the most conspicuous and easily identified landmark on the eastern shore of Sibuguey bay. It consists of one prominent peak, 1,050 feet high, with several peaks of less elevation stretching to the eastward of it.

Sibuguey river, which discharges about 3 miles northward of Patan point, is nearly dry at the entrance at low water. This river leads to the coal deposits behind Mount Sibuguey that were worked to some extent formerly, but are now abandoned on account of the difficulty of transport to the coast.

Pamandian river, which discharges into the bay about $1\frac{1}{2}$ miles southward of Kabut island, has a depth of 5 feet on the bar at low water, and considerably more inside.

Siay river, the largest and only river of any importance in this region, discharges into the north-eastern corner of Sibuguey bay. A clear but narrow and tortuous channel, having a least depth of 8 feet at low water, winds through the mud-flats of the bay to the mouth of the river. The river was ascended for a distance of 3 miles in a steam launch and no obstructions found.

Kabut island, forming the western side of the mouth of the river, is connected with the mainland southward of it at low water, and is not recognised as an island when seen from the bay.

Directions.—The following directions for entering the Siay river should not have implicit confidence placed in them, as changes are liable to take place on the bar and in the position of the hut referred to. To enter, bring the nipa hut at the mouth of the Ley river over one mile north of Kabut island, to bear N. 39° E., and steer for it ;

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

when within half a mile of the hut alter course to N. 88° E., and when the eastern side of the entrance of the Ley river bears N. 2° W., enter the Siay, keeping well over on the east side, where the best water will be found, until well into the river. Shoal water extends some distance from the eastern side of Kabut island; this may be avoided by keeping close to the eastern bank.

Tikauan point (*Lat. 7° 45' N., Long. 122° 45' E.*) is the most pronounced point in the north-east part of Sibuguey bay; it extends about half a mile south-westward, and is almost entirely covered with mangroves. Shoal water extends over 2 miles S. 30° E. from the point, and all the space to the eastward of that line is either shoal or dry at low water.

Chart 2576, Sulu archipelago.

OFF-LYING SHOALS.—Sibuguey bay.—Western side.—A shoal of $4\frac{3}{4}$ fathoms, at $8\frac{1}{2}$ miles S. 78° E. from Mount Taguite.

Central part of entrance.—A shoal of 3 fathoms, at 23 miles N. 73° E. from Sakol hill.

A shoal of 2 fathoms, at 14 miles N. 58° E. from Sakol hill; a small patch of 6 fathoms lies $2\frac{1}{2}$ miles eastward of this shoal.

A shoal of $2\frac{1}{2}$ fathoms, with several shoal spots from one to $1\frac{1}{2}$ cables apart, at 19 miles N. 67° E. from Sakol hill.

A shoal of 4 fathoms, at 18 miles N. 52° E. from Sakol hill.

A shoal of $2\frac{3}{4}$ fathoms, at $21\frac{1}{2}$ miles N. 60° E. from Sakol hill.

A shoal of $4\frac{3}{4}$ fathoms, at $24\frac{1}{2}$ miles N. 58° E. from Sakol hill.

A shoal of 4 fathoms, at $24\frac{3}{4}$ miles N. 54° E. from Sakol hill.

These shoals in the centre part of the entrance to the bay are all of coral and white coral sand formation, and are surrounded by deep water. In a favourable light they can usually be distinguished by the colour of the water.

Chart 2578, E. part of Sulu or Mindoro sea.

Eastern side.—West Circe shoal (*Lat. 7° 18' N., Long. 122° 38' E.*), lying about 10 miles S. 17° W. from Pandalusan island, and $9\frac{1}{2}$ miles off the coast of Olutanga island, has a least depth of 3 fathoms on one rock near the centre of the shoal.

East Circe shoal, lying $3\frac{1}{2}$ miles S. 76° E. from West Circe shoal, and $10\frac{1}{4}$ miles S. $\frac{1}{4}$ E. from Pandalusan island, is a small shoal with a least depth of $2\frac{3}{4}$ fathoms on it. On the north side of the shoal the water deepens rapidly, but southward the depths increase gradually, 15 fathoms being found one mile southward of the shoalest spot.

A rocky patch of $4\frac{1}{2}$ fathoms lies eastward of East Circe shoal, and

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

2½ miles off-shore; from it Seboto point bears S. 69° E., distant 3½ miles.

About 4½ miles S. 6° W. from Pandalusan island, and 6½ miles off-shore is a shoal about half a mile in extent, on which the least depth is 5 fathoms; it has been made out at a distance of over a mile from the colour of the water.

A bank of sand and rock, with depths under 10 fathoms, about 4½ miles long north and south, and very narrow at the southern end, lies 5 miles off-shore, with its northern end, bearing S. 14° E., 3½ miles from Pandalusan island. Near the north end of the bank is a coral patch of 1½ fathoms, and at 1½ miles farther southward one of 3½ fathoms.

From a position 2½ miles westward of Talaid point a reef, parts of which are awash at low water, extends 2½ miles southward, and for 2 miles farther in a south-south-east direction there are several patches of 4 and 5 fathoms. The outermost part of the reef is 4½ miles westward from the north-west point of Olutanga island.

North-west rock.—About 2½ miles N. 59° W. from Pandalusan island is a small coral reef, about a quarter of a mile in extent, which is awash at low water. It is not easily picked up, and vessels navigating on the eastern side of Sibuguey bay should keep well over towards Pandalusan island, and not attempt to pass westward of the reef.

Sand cay.—About 5 miles S. 48° W. from Patan point, and 3½ miles off the coast, there is a coral reef, of which the area awash at low water is nearly half a mile long north and south, and 1½ cables wide. On the northern part of the reef is a mound of white sand, which is generally awash at high water; its shape and position change with every storm. Deep water surrounds the reef on all sides, but the sand cay gives ample warning of the danger, and also serves as a fair landmark for navigating along this coast.

Coast.—From Seboto point, the southern extreme of Olutanga island, the coast trends east-north-eastward for about 10 miles to Taguisian point, the eastern extremity and the southern entrance point of Port Sibulan. Between these two positions there are two fairly prominent points, Kangan and Sarva, between and on either side of which are bays; that between Sarva and Taguisian points is known as Pongka bay, the others have no names. Pongka bay is about one mile wide and 3 miles deep; it is practically closed by reefs, and affords no anchorage. All this part of the coast is fringed by wide reefs which dry at low water.

Silagui islet (*Lat. 7° 17' N., Long. 122° 51' E.*) is a small low islet covered with light timber, lying on the same reef as Lutangan

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

island and northward of it. Its southern and eastern sides are low, brown cliffs. A small rocky islet, 20 feet high, and covered with bushes, lies 60 yards eastward from Silagui island. The reef on which the island lies extends a quarter of a mile eastward and half a mile northward; a patch, dry at low water, lies a quarter of a mile north-eastward of the bushy islet just mentioned.

Anchorage.—Good anchorage may be found in a pocket in the reef three-quarters of a mile north-north-westward of Silagui islet, where there is clear anchorage space of over a quarter of a mile, with a depth of 8 fathoms, mud bottom.

Arayat shoal, extending one mile east and west, and half a mile broad, with a depth of 2 fathoms, lies with the south point of Lutangan island bearing N. 89° W., distant 6 miles, and Taguisian point North. A chain of shoals extend from here towards Dumankilas point.

Shoals. — At distances of $2\frac{1}{2}$ and 7 miles, respectively, eastward of Arayat shoal, are shoals covered by 5 and 8 fathoms of water; the eastern is named Liscum bank. In the area bounded by Lutangan island, Taguisian point and Arayat shoal, there are a number of shoal spots covered by depths of from 4 to 6 fathoms; when over them the bottom can be distinctly seen, and they are readily picked up from a distance by the discoloured water. Their position will be best understood by reference to the chart.

Chart 3463, Dumankilas bay.

Taguisian point (*Lat. 7° 22' N., Long. 122° 57' E.*), the eastern extremity of Olutanga island, is a long narrow neck of land projecting in a south-east direction. It is low, heavily wooded, about 3 miles long, and varies in width from $1\frac{1}{2}$ miles to 2 cables. Narrow belts of mangroves fringe its north-eastern and south-western sides. Cliffs, having a greatest height of 40 feet, and a white sand-beach, mark the end of the point. The large trees which cover the point grow up to the very edge of the cliffs, and present an abrupt profile when seen from the north-east or south-west; the cliffs are largely covered with bushes. The point is bordered by a reef 4 cables wide, with good water at a distance of three-quarters of a mile.

Chart 2578, E. part of Sulu or Mindoro sea.

PORT SIBULAN includes the central and largest part of the water area between Mindanao and Olutanga island. It is about 6 miles wide at the entrance between Taguisian and Lapat points, and extends 8 miles north-westward. From the head of the port Tantanang bay extends northward into Mindanao, and Tumulung bay southward into

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Olutanga; there are also a number of smaller bays. The best water in Port Sibulan, between the entrance and the mouths of Tantanang and Tumulung bays, is on the south-western side, where the shore may be approached to a distance of three-quarters of a mile at any place, and usually much closer.

Chart 3463, Dumankilas bay.

South-western side.—Koayan bay, between Komot and Kambulong points, about $2\frac{1}{4}$ and $3\frac{1}{4}$ miles, respectively, from Taguisian point, has not been sounded out. Both entrance points are low, wooded, and fringed with mangroves. The entrance to the inner and western end of the bay is marked by two rocky islets, 30 and 15 feet high, and covered with brush.

Kambulong point (*Lat. 7° 25' N., Long. 122° 55' E.*) is surrounded by a reef, on which the depth is one fathom, at 4 cables eastward of the point; at three-quarters of a mile from the point the depth is 5 fathoms, outside which it deepens rapidly.

Chart 2578, E. part of Sulu or Mindoro sea.

From Kambulong point the coast trends in a north-west direction for $3\frac{1}{2}$ miles to Sumangul point, the northern extreme of Olutanga island.

Sibulan island, lying 5 miles north-westward of Taguisian point, is small and wooded, with steep rocky sides; it is 65 feet high, and is a good mark for vessels bound into Port Sibulan. There is good water northward of the island, but there is no passage between it and Olutanga. Sibulan river discharges about one-third of a mile south-westward of Sibulan island; on the western side of the entrance are rugged cliffs, and on the eastern a low point with a curved sandy beach.

Sumangul point, $6\frac{3}{4}$ miles north-westward of Taguisian point, is conspicuous when seen from the eastward, and may be readily identified from off the entrance. It terminates in a neck of land half a cable wide, and $1\frac{3}{4}$ cables long in a north-west direction, and is separated from the land to the southward by a low depression, which is very plain when seen from the eastward or westward. The point is 54 feet high, and wooded.

Taledom rock, half a mile north-east of Sumangul point, is a dark isolated rock 31 feet high, with bushes on the top; it shows up well except when seen from the northward. A spit of sand dries for one cable north and west from the rock, and depths under one fathom extend a quarter of a mile northward, with the 5-fathoms contour a quarter of a mile further in that direction.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Tumalung bay, the entrance to which is between Sumangul point and Marek point in Mindanao, is the largest indentation in Port Sibulan. It is nearly 2 miles wide at the entrance, and extends about 5 miles southward. Its bottom is very irregular, with depths of from 2 to 10 fathoms, and there are numerous detached patches of coral and sand throughout the northern part of the bay. The southern half of the bay shoals gradually to within about one mile from its head, where there are extensive mud-flats, dry at low water. The shores are fringed with mangroves. Water may be easily obtained from a small stream about three-quarters of a mile southward of Sumangul point; at high water a boat can be filled directly from a bamboo pipe, but at low water can only get within 50 yards of it.

Anchorage.—Good anchorages, in from 5 to 10 fathoms, are found on the eastern side of Tumalung bay, south-westward of Sumangul point.

Lapinigan islands, two in number, lie in the western part of Tumalung bay, on the northern side of the entrance to Canalizo strait. They are low, heavily wooded, and nearly surrounded by mangroves. Cliffs about 30 feet high mark the north-eastern end of the eastern and larger island, and two cliffs 15 feet high mark the northern end of the smaller. Shoal water extends a long way eastward of the islands, which should not be approached within a mile on that side.

Marek point (*Lat. 7° 28' N., Long. 122° 52' E.*), north-westward of Sumangul point, projects three-quarters of a mile southward, and is about $1\frac{3}{4}$ cables wide. Westward of it is a small bay, into which the Modok river discharges. The western side of the point is fringed with mangroves, while the southern extreme is composed of low perforated cliffs and a sand-beach. On the eastern side is a reddish-brown bank, 65 feet high, partly bare, which is a good landmark, and is visible from the entrance of the port.

Saong bay, between Marek and Tantanang points, is about 2 miles wide, and extends about $1\frac{1}{2}$ miles westward. Mangroves and coral fringe the shores and project well off the southern entrance point. The Panagan river flows into the head of the bay, and a small sandy beach northward of the river entrance may be seen from the entrance to the bay.

Tantanang point is a low, densely-wooded point terminating in low cliffs about 15 feet high.

Rocks.—A pile of rocks, dry at half-tide, lies one cable east-south-eastward of Tantanang point.

General charts 943, 1263.

Chart 3463, Dumankilas bay. Var. 1° 30' E.

North-eastern side.—Lapat point (Lat. 7° 27' N., Long. 122° 58' E.), the north-eastern entrance point of Port Sibulan, is low, heavily wooded, and fringed with a narrow belt of mangroves. At the southern extremity of the point are some low cliffs, about 20 feet in height. The point is surrounded by reefs which extend about one mile southward and 2 miles eastward from it, and the depths are irregular for 1½ miles southward of the point.

Balangan bay, between Lapat and Tegalting points, is nearly 2 miles wide, and extends 1½ miles northward; the head of the bay is shoal. The entrance is from the south-eastward between the reefs which surround Letayen island and Lapat point, and is free from danger, with a least depth of 10 fathoms in the middle. There is also a narrow channel from the westward between the north-west point of Letayen island and the reefs which extend about two-thirds of the way from Tegalting point to the island.

Anchorage.—Good anchorage will be found in 8 fathoms, mud, about half a mile north-eastward from the middle of Letayen island.

Letayen island, situated in the entrance to Balangan bay, about 6 cables south-eastward of Tegalting point, is the largest island in Port Sibulan. It is three-quarters of a mile north-west and south-east, a quarter of a mile wide, heavily wooded, and surrounded by reefs which extend about 1½ miles in a south-east direction.

Tegalting point is heavily wooded, and rises to a height of 126 feet about three-quarters of a mile north-westward from its southern extremity. The eastern side is fringed with mangroves, at the southern end of which is a prominent reddish-brown cliff about 40 feet high; the western and south-western sides are composed of a sand beach and low cliffs. Shoal water surrounds the point to a distance of half a mile.

Chart 2578, E. part of Sulu or Mindoro sea.

Kaladis point.—From Tegalting point the coast trends north-westward 2½ miles to Kaladis point, and is composed of mangroves, low cliffs, and sandy beach. It is fringed by a reef, which from half a mile wide at Tegalting point decreases in width towards the north-west end, where it is narrow. Kaladis point consists of a low red cliff, 15 feet high; although not conspicuous, it is the most prominent point on the northern side of Port Sibulan, northward of Tegalting point.

Tantanang bay, extending northward into Mindanao from Port Sibulan, is nearly 3 miles wide at the entrance between Tantanang and Kaladis points, and extends over 2 miles northward. Between Tan-

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

tanang point and the north-east corner of the bay nearly all the shore is fringed with mangroves; at three-quarters of a mile N. $\frac{3}{4}$ E. from Tantanang point is a low cliff showing clear of the mangroves, forming a small point covered with large trees; rocks, awash at high water, lie over $1\frac{1}{2}$ cables east-north-eastward of the cliff. What small points there are on the eastern side of the bay are composed of low reddish-brown cliffs and heavily wooded; the indentations are fringed with mangroves.

Anchorage (*Lat. 7° 31' N., Long. 122° 54' E.*).—Tantanang bay shoals gradually from the entrance to the head, affording good sheltered anchorage in from 8 to 15 fathoms.

DANGERS.—**Middle reef**, with a least depth of $1\frac{1}{2}$ fathoms, is $3\frac{1}{2}$ miles long north-west and south-east, and three-quarters of a mile broad; the shoalest spot lies about $3\frac{3}{4}$ miles N. 6° W. from Taguisian point, with Sibulan island bearing N. 74° W.; the general depths on the reef are from $2\frac{1}{2}$ to 5 fathoms.

Sibulan reef, with $2\frac{3}{4}$ fathoms on it, lies about 9 cables N. $\frac{3}{4}$ E. from Sibulan island. The above two reefs are the only detached dangers near the recommended track into Port Sibulan.

A shoal with 3 fathoms on it lies about one mile south-westward of the north-west point of Letayen island, with depths of $3\frac{1}{2}$ to 5 fathoms about 4 cables north-westward from it.

Pandan reef.—The northern end of this reef lies one mile southward of Kaladis point, and the same distance westward from the shore. It is $1\frac{1}{4}$ miles in length north and south, half a mile wide, and is nearly dry at low water. Two mounds of white sand on it are covered at half flood. It is separated from the shore reef by a narrow channel with a least depth of 5 fathoms. Kaladis point, bearing N. 16° E., leads westward, and the north point of Letayen island, bearing East, leads southward of the reef.

Charts 3463, 2578.

Directions.—Vessels entering Port Sibulan should round Taguisian point at a distance of not less than one mile, and steer N. 53° W., which leads over the southern end of Middle reef and nearly midway between Sibulan island and Sibulan reef. If bound to Tantanang bay alter course to N. 22° W. when Sibulan island bears S. 2° E., and proceed to the anchorage desired.

To enter the anchorage in Tumalung bay, the N. 53° W. course should be continued until Sumangul point bears S. 2° E., when alter to S.W. by S., and when the same point bears N. 88° E., alter again to S. by W. $\frac{1}{4}$ W., and proceed with caution as the water is always muddy and the dangers cannot be seen.

General charts 2578, 943, 1263.

Chart 3463, Dumankilas bay. Var. 1° 30' E.

DUMANKILAS BAY is about 11 miles wide at the entrance between Lapat and Dumankilas points, and extends about 15 miles northward. It affords good shelter and holding ground among the islands and bays that it encloses; the general depth in the inner part of the bay is 8 to 16 fathoms, with 5 fathoms near the shore. In the outer part the general depths are from 10 to 32 fathoms. The bottom in the vicinity of Lapat point is rocky and irregular, and this side of the entrance should be avoided. The best channel into the bay will be found by keeping within a mile of the points on the eastern side.

Western side.—The western side of Dumankilas bay is wooded, and rises gradually to Mounts Kaladis and Tres Reyes. Mount Kaladis (Lapirauan), 1,900 feet high, lies $7\frac{1}{4}$ miles N. by W. $\frac{1}{2}$ W. from Lapat point, and is $4\frac{1}{2}$ miles westward of the western shore of the bay; Mount Tres Reyes, 1,200 feet high, lies $7\frac{1}{2}$ miles north-north-eastward of Mount Kaladis. The western shore of the bay is foul.

Eastern side.—**Dumankilas point** (Lat. $7^{\circ} 29' N.$, Long. $123^{\circ} 12' E.$), the eastern entrance point, is a bold promontory, clear of danger to the southward, but with shoal water extending for one-third of a mile to the westward. The shore between Dumankilas and Labukan points forms a deep bay, which is very foul near its head.

The coast between Dumankilas point and Karabuka point, 7 miles north-westward, consists of low hills, covered with high trees. From Labukan point to Buka point the shore line should be given a berth of at least a mile, as the bottom is very irregular and a 5-fathoms patch is situated $1\frac{1}{2}$ miles to the north-westward of the former point. Karabuka point may be passed within half a mile.

Igat island, 735 feet high, forming the south-west side of Igat bay, is separated from the mainland by a narrow channel, near the eastern end of which there is a good watering place. Igat point, the western extreme of the island, is clean and steep-to. The bay formed by the south side of Igat island and the mainland is $2\frac{1}{2}$ miles wide at the entrance between Karabuka and Igat points, and extends $1\frac{1}{2}$ miles eastward. It is deep and clear with the exception of the shoal mentioned hereafter.

Igat bay, to the eastward of Igat island, is $3\frac{1}{2}$ miles wide between Dayana and Igat points, and extends 5 miles to the south-eastward. It forms a safe and commodious harbour in all winds. Shoal water extends for a mile off its eastern shore, but elsewhere it is clear of danger, the depths varying from 7 to 17 fathoms with a muddy bottom. A small stone pier with a wooden extension is

General charts 2578, 943, 1263.

Chart 3463, Dumankilas bay. Var. 1° 30' E.

situated on the south shore of the bay. Vessels of 10 feet draught can use it at any time of tide. There is a settlement close to it. Fort Margosatubig, an old Spanish fort, lies a quarter of a mile south-westward of the pier. About 2 cables eastward of the stone pier is a wooden wharf about 200 feet long with a depth of 18 feet at its end, belonging to a sawmill, where vessels load lumber.

The Dumankilas and Lapuyen rivers discharge on the eastern side of Igat bay.

LIGHT.—A red fixed light is exhibited at an elevation of about 27 feet above high water, from the roof of the shed on the wharf at Margosatubig, Igat bay. It is visible 10 miles in clear weather, and should be seen immediately after rounding Igat island; it is maintained by the military authorities.

The head of Dumankilas bay is filled with a bank which partly dries at low water. The Kumalarang river, with depths of from 2 to 6 feet flows into the head of the bay; fresh water may be had near the village of Kumalarang, eastward of the river and 3 cables back from the shore of the bay. At about $5\frac{3}{4}$ miles eastward of the north-east corner of the bay, Mount Imbing rises to a height of 2,300 feet.

Islands in Dumankilas bay.—Muda, Dakula, and Paya are three small islands on the western side of the bay; they are clear and steep-to on their eastern sides.

Cherif islands are three small islands, clear and steep-to, $2\frac{1}{4}$ miles to the north-eastward of Dakula island; the two largest islands are 220 and 100 feet high respectively.

Dayana island, lying $2\frac{1}{2}$ miles to the northward of the Cherif islands, is small and clear of danger.

Triton island (Lat. $7^{\circ} 30' N.$, Long. $123^{\circ} 10' E.$), situated on the eastern side of the entrance, about midway between Dumankilas and Labukan points and half a mile outside of a line drawn between them, is a small, rocky, wooded island, 158 feet high. Shoal water surrounds it, extending 2 cables south-westward and 3 cables north-eastward.

Igat island, on the eastern side of the bay has been already described.

Putili islet, lying in the middle of the entrance to Igat bay, is very small and steep-to.

Fatima islands are two small islands lying close together on the bank which fills the northern end of Dumankilas bay; they are clear and steep-to on the south side. Cabo or Gatas island is a small circular island, close to the shore to the south-eastward of the Fatima islands.

General charts 2578, 943, 1263.

Chart 3463, Dumankilas bay. Var. 1° 30' E.

Shoals in approach.—**Breeches shoal**, with a least depth of 5 fathoms over it, is situated $8\frac{1}{4}$ miles S. 21° W. from Dumankilas point, and extends for about $1\frac{1}{2}$ miles in a north-easterly direction from that position.

A patch with a depth of 3 fathoms is situated about $6\frac{1}{4}$ miles S. 37° W. from Dumankilas point.

A shoal with a depth of 5 fathoms is situated $4\frac{1}{2}$ miles S. 30° W. from Dumankilas point.

A rocky patch of $4\frac{1}{4}$ fathoms lies approximately S. 10° W. $3\frac{3}{4}$ miles from Dumankilas point.

A patch with a depth of 3 fathoms is situated $5\frac{1}{4}$ miles S. 71° W. from Dumankilas point.

Acha rock (*Lat. $7^{\circ} 29' N.$, Long. $123^{\circ} 6' E.$*), with a depth of $2\frac{3}{4}$ fathoms, is situated $5\frac{1}{2}$ miles S. 85° W. from Dumankilas point. Between Acha rock and Lapat point the bottom is foul and irregular, the depths varying from 3 to 26 fathoms.

Shoals within the bay.—A shoal with a depth of $4\frac{3}{4}$ fathoms is situated $1\frac{1}{2}$ miles S. 87° W. from Karabuka point.

A large shoal of white sand, which uncovers at low water springs, is situated in the middle of the bay between Karabuka point and Igat island.

Piratas rocks, which are always visible except at very high tides, lie one mile to the eastward of Dakula; they are steep-to on their southern and western sides, but shoal water extends 2 cables to the eastward and 3 cables to the northward.

A shoal with a depth of $1\frac{1}{2}$ fathoms is situated about half a mile north-north-west from the largest Cherif island.

A shoal with a depth of $1\frac{3}{4}$ fathoms is situated $1\frac{1}{4}$ miles N. 30° E. from the north end of the largest Cherif island.

A shoal about half a mile wide and with a least depth of $1\frac{1}{2}$ fathoms is situated about a mile to the south-eastward of Putili islet. The channel between this shoal and Igat island is $1\frac{1}{4}$ miles wide and from 15 to 17 fathoms deep.

Directions.—Vessels bound for Igat bay should approach with Dumankilas point bearing North and N.W., afterwards giving the point, Triton island, Labukan and Buka points a berth of a mile, and Karabuka and Igat points and the north side of Igat island a berth of half a mile, and anchor according to draught off the pier on the south side of the bay. Vessels approaching the pier should not go more than 50 feet west of it, because of shoal water.

Anchorage may be obtained in 11 fathoms, mud, at half a mile from the shore anywhere to the westward of the small stone wharf on

General charts 2578, 943, 1263.

Chart 3463, Dumankilas bay. Var. 1° 30' E.

the south side of Igat bay, or nearer the wharf according to draught. A small shoal of $2\frac{1}{2}$ fathoms extends $1\frac{1}{2}$ cables eastward from the point a short distance north-westward of the pier. The anchorage is perfectly landlocked, and one of the best in Mindanao.

Tides.—It is high water, full and change, at Cherif island, at 6h. 18m.; springs rise $6\frac{1}{2}$ feet, neaps 5 feet.

MALIGAY BAY, lying between Dumankilas point and Baganian peninsula, is about 5 miles wide at the entrance and some $3\frac{1}{2}$ miles deep. A shoal bight about one mile in extent trends eastward from the head of the bay. The shores of the western part of the bay are rocky and interspersed with mangroves, while the entire north-eastern and eastern shores are fringed with mangroves, except for a space of one mile at the foot of Mount Panaga. The shore is fronted by a reef dry at low water, and varying in width from $1\frac{1}{4}$ cables to $1\frac{1}{4}$ miles.

Makulay island is a small rocky wooded island, 293 feet high, lying on the shore reef close to the land in the north-western part of the bay. It is half a mile long north-west and south-east and a quarter of a mile broad.

Lunquigui island, 3 cables long east and west and 284 feet high, lies on the shore reef in the northern part of the bay; it is rocky and wooded.

Mount Panaga (*Lat. 7° 29' N., Long. 123° 18' E.*), 532 feet high, is situated on the eastern shore of Maligay bay; it is covered with kogon grass, and presents a green appearance when seen from seaward.

Reefs.—In the eastern half of the entrance to Maligay bay there are a number of dangerous rocky patches, covered by a least depth of 2 fathoms. The middle of Makulay island bearing North leads westward of these reefs.

Anchorage.—Good, well-protected anchorage can be found in from 20 to 25 fathoms north-eastward of Makulay island; this is the only sheltered anchorage in Maligay bay during the south-west monsoon.

Chart 2578, E. part of Sulu or Mindoro sea.

Baganian peninsula, between Dumankilas and Illana bays, extends about 13 miles in a south-east direction, and has a general width of about 5 miles. It is traversed throughout its length by a range of hills, the highest of which, Mount Flecha, 1,126 feet high, flat-topped, and heavily-wooded, can be seen from a long distance seaward. The base of the peninsula, between Maligay bay and Port

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Sambulauan, is low and only about 2 miles wide. Between Maligay bay and a small bay about $2\frac{1}{2}$ miles northward of Flecha point, the west coast is fringed with mangroves, thence to Flecha point the shore is a rocky ledge 15 feet high, broken by sand beaches.

The west coast of Baganian peninsula is fringed by a steep-to coral reef, dry at low water, varying in width from one mile at the northern part to one cable in the vicinity of Flecha point.

Flecha (Arrow) point (*Lat. 7° 22' N., Long. 123° 24' E.*), the southern extremity of Baganian peninsula, terminates in a rocky ledge about 15 feet high, behind which the land rises gradually to Mount Flecha. The point is heavily wooded, and very prominent.

Anchorage.—During the north-east monsoon vessels can anchor westward of Mount Flecha in about 20 fathoms. There is also anchorage in 10 to 20 fathoms on the sandy flat which extends nearly one mile off Flecha point, but when the monsoon blows fresh, a heavy sea sets round the point.

Panikian island, lying $4\frac{1}{2}$ miles W. $\frac{3}{4}$ N. from Flecha point, and about 2 miles from the shore, is 20 feet high, sandy, and sparsely wooded with high trees. It is surrounded by reefs, partly dry at low water, which on the southern side extend to a distance of three-quarters of a mile. This reef shows green, and its edges fall almost perpendicularly to depths of over 100 fathoms. About a quarter of a mile S.S.E. from the island, and growing on the reef, is a hemispherically-shaped clump of trees, about 50 feet high, which from its shape and colour is more easily made out from seaward than the trees on the island. The channel between Panikian island and Baganian peninsula is deep and clear.

Tambulian point, the south-eastern extreme of Baganian peninsula, lying about 3 miles east-north-eastward of Flecha point, is low, wooded, and not very prominent unless viewed from a north-east or opposite direction. The Baganian river, a small stream, discharges through the mangroves at the head of the bight between Flecha and Tambulian points.

ILLANA BAY is comprised between Tambulian point and Tapanian point, distant 39 miles E. by S. $\frac{1}{2}$ S. It is separated from Pangail bay on the north side of Mindanao by an isthmus $7\frac{1}{2}$ miles in width.

Tidal streams.—The tidal streams in Illana bay run with considerable velocity, especially the ebb, near and eastward of Flecha point. Vessels from Samboanga to Malabang and Kota Bato will often find, on nearing the eastern side of the bay, that they have been set appreciably southward. Near Flecha point the streams run

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

with great velocity and cause a heavy sea when there is any wind. Allowance must always be made for the tidal streams, and care exercised in coasting in this vicinity, especially at night.

Coast.—The eastern coast of Baganian peninsula, from Tambulian point northward is more irregular than the western. The land rises gradually towards Mount Flecha, and is densely wooded and thinly inhabited. It is fringed by a coral reef, dry at low water, which, northward of Lumbug cove, gradually widens until at Gasakan point it is a mile wide. There are no large streams along this part of the coast, the Bubuday, which discharges $1\frac{1}{2}$ miles southward of Gasakan point, being the largest. There are no off-lying dangers in the vicinity with the exception of Rios rock, and the eastern side of Baganian peninsula may be safely approached to the distance of one mile.

Tambatan point (*Lat. 7° 26' N., Long. 123° 27' E.*), situated $3\frac{1}{2}$ miles northward from Tambulian point, is low and not prominent unless seen from northward or southward.

Lumbug cove lies about $3\frac{1}{2}$ miles north-westward from Tambatan point; reefs extend from both entrance points, narrowing the channel to a width of $1\frac{1}{2}$ cables. The cove is fringed with reefs, leaving an anchorage area about 4 cables in diameter and 10 fathoms deep. At about 6 cables south-eastward of the entrance is a bare bluff, which shows white in the sunlight and forms a good mark for making the cove.

Rios rock, situated in the approach to Port Sambulauan, is a dangerous reef, three-quarters of a mile in extent, with a least depth of one fathom over it. It lies N. 4° E., 5 miles from Tambatan point, and the same distance from the north-eastern Bakayauan hill.

Clearing marks.—Tambulian point just shut in behind Tambatan point, leads westward, and the eastern tangent to the land northward, bearing North, leads eastward of Rios rock.

Gasakan point, the southern entrance point of Port Sambulauan, is low and fringed with reefs, which extend nearly $1\frac{1}{2}$ miles eastward from it. Southward and south-westward from the point, at distances of less than a mile, are the Bakayauan hills, which are conspicuous. The north-eastern hill is 405 feet high and well wooded; the south-western hill, 360 feet high, is covered with grass.

Pisan island, forming the north-eastern side of Port Sambulauan is low and ill defined, consisting chiefly of mangroves. It is about 3 miles long north-west and south-east, about one mile wide, and is irregular in shape. It is separated from the mainland by the Dinas and Panaldan rivers.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Pisan point, the southern extreme of Pisan island, consists of mangroves, and is surrounded by reefs which extend $1\frac{1}{2}$ miles south-eastward and $2\frac{1}{2}$ miles eastward from it.

Port Sambulauan, situated about $7\frac{1}{2}$ miles north-westward from Tambatan point, is of little importance, being merely a narrow tortuous break in the reefs. The entrance between Gasakan and Pisan points is $1\frac{1}{4}$ miles wide, but reefs from both sides reduce the navigable width of the channel to less than 4 cables. The port is fringed on all sides with reefs on which numerous heads dry at low water, and there are dangerous patches in the channel. The water is generally dirty yellow, and the dangers are difficult to distinguish except at low water. The direction of the channel is with Sambulauan hill bearing N. 56° W., but as the reefs overlap no courses can be given. The tidal streams follow the channel producing strong currents and eddies at its mouth.

Contracted anchorage may be found at the head of the port in 4 or 5 fathoms, mud, but no directions can be given, and in the absence of any aids to navigation the entrance is dangerous.

Sambulauan hill (*Lat. $7^{\circ} 35'$ N., Long. $123^{\circ} 19'$ E.*), lying about half a mile north-westward from the head of Port Sambulauan, is about 300 feet high. It is much lower than the mountains behind it, which attain altitudes of 2,000 feet, but owing to its being covered with kogon grass it stands out prominently, especially on a clear day.

Dinas.—The town of Dinas, situated about $2\frac{1}{2}$ miles northward from the head of Port Sambulauan, on the Dinas river, which discharges westward of Pisan island, is not visible from the sea. It has a population of about 2,000, with several Chinese stores and a market.

Malabug bay, included between Pisan point and Malabug point, $6\frac{1}{2}$ miles north-eastward, is nearly blocked with reefs, the greater part of which are awash at low water, leaving narrow channels between them. The shore line consists of mangroves, behind which the land rises gradually to the mountains. Two large rivers, the Panaldan and Tuludan discharge into the bay, the delta of each forming a network of small streams through the mangroves. Two small villages, Kalipapa and Dansalan, lie on the shore of the bay.

Reefs.—In addition to the reefs blocking Malabug bay, there are a number of detached reefs covered by a least depth of one fathom, lying in the entrance. They lie in a north-east and south-west direction on a line between the reef extending eastward from Pisan point, and Sagayaran island. The channel between their north-east extremity and Sagayaran island is nearly three-quarters of a mile wide,

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

deep, and clear. The middle of Sagayaran island bearing nothing eastward of North, leads eastward of all dangers in the approach to Malabug bay.

Sagayaran island (*Lat. 7° 36' N., Long. 123° 27' E.*), lying about one mile southward of Malabug point, at the north-eastern end of Malabug bay, is a well-wooded and conspicuous island about three-quarters of a mile in extent; it rises to a height of 375 feet in the south-western part, and is surrounded by reefs which partly dry at low water. There is no channel between it and the mainland.

Anchorage.—Good protected anchorage may be found about a quarter of a mile westward of the western end of Sagayaran island, in 16 fathoms, mud. This is the best anchorage in this vicinity.

Tikala islets are three small wooded islets lying between Malabug point and Sagayaran island. The two southern islets are on the same reef as Sagayaran and immediately northward of it; the western of these two is 185 feet, and the eastern 170 feet high. The northern islet, 120 feet high, lies on the shore reef surrounding Malabug point.

Reef.—A small coral reef, about a quarter of a mile in extent, with a least depth of $4\frac{1}{2}$ fathoms on it, and surrounded by deep water, lies about three-quarters of a mile eastward from the south-eastern Tikala islet, with the south-east tangent to Sagayaran island bearing S. 50° W.

Coast.—From Malabug point the coast trends northward and then north-westward for $7\frac{1}{2}$ miles to Dupulisan point, and is bold, rising rapidly to heights of from 1,400 to 1,650 feet. The shore-line is rather irregular, being indented by a number of small coves, at the head of which streams discharge through the mangroves; all these coves are blocked by reefs.

The various points along this coast are poorly defined, and from all positions off-shore the coast appears very rounded. All the points are fringed by reefs to a short distance. Several small villages lie along this stretch of coast.

Reefs.—About $2\frac{1}{2}$ miles north-eastward of Sagayaran island is the southern extreme of a reef which extends nearly a mile northward, with a width of about 4 cables. The least depth on the reef is 2 fathoms, and it is plainly marked by discoloured water. The channel between it and the shore reef is nearly one mile wide. The south-eastern side of Sagayaran island bearing S. 45° W. leads south-eastward, and the tangent to the land northward bearing N. 17° W. leads eastward of the reef.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

At about one mile northward and $1\frac{1}{2}$ miles north-eastward from the above reef are two rocky patches, covered by $4\frac{1}{2}$ and $5\frac{1}{2}$ fathoms respectively. The channel between these reefs and the land is one mile wide, deep and clear. The south-eastern side of Sagayaran island, bearing S.W. $\frac{3}{4}$ S., and the tangent to the land northward, bearing N. 32° W., leads eastward of these reefs.

Tagalo point (*Lat. $7^\circ 44'$ N., Long. $123^\circ 29'$ E.*), the north-eastern extreme of the land in this vicinity is a bold round headland, which rises to a height of 800 feet at a distance of three-quarters of a mile inland; it is bordered by a very narrow reef, and can be passed in safety at a distance of half a mile.

Tagalo reefs.—At about $1\frac{1}{2}$ and $2\frac{3}{4}$ miles eastward from Tagalo point are the Tagalo reefs, two in number. They consist of two small rocky patches covered by a least depth of 2 fathoms, with a deep channel between them. The channel between them and Tagalo point is deep and clear.

Pagadian bay, in the north-west part of Illana bay, is about 9 miles wide between Tagalo and Kaliban points, extends about 5 miles north-westward, and includes the anchorages of Dupulisan and Pagadian. The land on the western side of the bay rises gradually towards the mountains, but on the northern side it is low and flat. Near the middle of the entrance is the south-eastern limit of a chain of reefs, which extend nearly to the shore about 4 miles north-westward. Parts of these reefs always break, parts are awash at low water, and the remainder are covered by very little water. There are several channels between these reefs, and there is also a channel between them and the shore north-westward, but the best channel into Dupulisan and Pagadian anchorages is between them and Tagalo point. The outer of these reefs is named Boka reef.

Dupulisan point, about 3 miles north-westward of Tagalo point, is about 40 feet high and covered with kogon grass: it stands out clear from the wooded background, which rises to a height of 700 feet at a distance of less than a mile inland. It is bordered by a narrow reef, which is steep-to.

Dupulisan anchorage, immediately westward of Dupulisan point, is nearly $1\frac{1}{2}$ miles wide at the entrance, and extends about one mile south-westward. The shores of the bight are fringed with coral, but the middle is clear, and good anchorage may be found in 14 fathoms, mud.

Reef.—About 6 cables east-north-eastward of the northern entrance point of Dupulisan anchorage is a small reef with a least depth of 3 feet on it.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Pagadian anchorage, northward from Dupulisan anchorage, is fringed with reefs, and in the northern part are several reefs awash at low water. The remainder is clear, and affords a large area of anchorage in any desired depth.

The village of Balangasan lies on the shore of the north-western part of the anchorage, and the village of Pagadian lies between the mouths of two rivers on the eastern shore.

Dumagui islet, lying close to the shore on the western side of the entrance to Pagadian anchorage, is small, wooded, and 190 feet high. It may be safely passed on its eastern side at a distance of a quarter of a mile.

Lampaki islet, small, flat, and wooded, lies on the shore reef at the head of Pagadian anchorage.

Good anchorage may be had midway between Dumagui and Lampaki islets in 14 fathoms, mud, or in the same depth between Lampaki and Pagadian. In approaching the latter, foul ground, lying about half a mile south-eastward of Lampaki islet, should be avoided.

Suanbato point (*Lat. 7° 49' N., Long. 123° 27' E.*), on the eastern side of Pagadian anchorage, is low and flat, covered with mangroves, and bordered by reefs which extend about a mile southward. This point is not readily made out from the southward, but shows up well when seen from eastward or westward.

Coast.—From Suanbato point to Kaliban point the coast trends about E. by N., with a curve northward, for about 8 miles, and is low and fringed with mangroves. From Suanbato point to within $1\frac{1}{2}$ miles of Tukuran river reefs extend about half a mile from the shore; they then terminate, and the remaining stretch of coast is steep-to.

There are numerous villages on the shore.

The valley between the eastern side of Pagadian anchorage and Kaliban point is drained by a number of rivers, and is the richest and best-cultivated tract of country on the shores of Illana bay.

Tukuran, at the mouth of the river of the same name, consists of three houses, and some old barracks on the hill. The governor's house is near the blockhouse on the beach.

Anchorage may be had at $1\frac{1}{2}$ or 2 cables from the shore in 20 fathoms, mud, by standing in with the blockhouse bearing N. 7° W. This anchorage should be approached with caution, as the water shoals suddenly. The sea in this vicinity is much discoloured at times by muddy water from the river.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Kaliban point (*Lat. 7° 50' N., Long. 123° 35' E.*), situated one mile eastward of the entrance to the Tukuran river, is clean and steep-to. The land behind the point rises rapidly to heights of over 1,000 feet, which are covered with kogon grass and small timber. This ridge is the only mountain of this description on the north shore of the bay, and is easily distinguished from as far as Flecha point by its green appearance.

Dugolaan point, about 6 miles eastward of Kaliban point, is surmounted by a hill 335 feet high, and is clean and steep-to. The greater part of the shore line between Kaliban and Dugolaan points consists of mangrove swamps with flat heavily-wooded land behind them. Reefs, partly dry at low water, border this part of the coast to a distance of 4 cables in places.

Reefs.—A chain of dangerous detached reefs, with as little as $1\frac{1}{2}$ fathoms over them in places, begins at the shore reef about 2 miles eastward of Kaliban point, and extends in south-east direction for about 7 miles to within a little over a mile from Semaruga point. These reefs are steep-to on their seaward sides. There are several channels between the reefs, and under favourable conditions it is an easy matter to pass inside them.

Anchorage.—There is no anchorage westward of Dugolaan point inside the reefs, as in most cases they join the shore reef, but good clear anchorage may be found eastward of the point, in Koromata bay, in about 20 fathoms, mud.

Koromata bay, between Dugolaan point and Semaruga point, 5 miles south-eastward, is clear with the exception of a coral patch on which the least depth is 2 fathoms, lying about half a mile from the shore and N. by W. $\frac{1}{2}$ W. 2 miles from Semaruga point. Elsewhere the water shoals gradually to the shore, affording anchorage in any desired depth. Dato rock is a large rock awash, lying about one mile northward of Semaruga point and $1\frac{1}{2}$ cables from the shore.

Semaruga point, the eastern entrance point to Koromata bay, is a small, well-wooded promontory, 130 feet high, connected with the mainland by a low isthmus: it is clean and steep-to.

Sigayan bay, lying between a point about two-thirds of a mile eastward of Semaruga point and Sigayan point, is about 2 miles wide, and extends one mile north-eastward. The shores of the bay rise gradually to a height of 100 feet, and abruptly to a ridge about 1,000 feet in elevation. Sigayan bay is deep and clear, and anchorage, well protected from northerly winds, may be found near its head in 20 fathoms, sand.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Sigayan point, the south-eastern entrance point of Sigayan bay, is over 100 feet high, well wooded, clean, and steep-to.

About half a mile southward from Sigayan point is a reef with a least depth of $3\frac{3}{4}$ fathoms on it, with a deep channel between it and the point.

Coast.—From Sigayan point the coast trends E. by S. $\frac{1}{4}$ S., with a curve northward, for 13 miles to Lapitan point, and is clean and fairly steep-to. It consists of a number of small bold points, with small bays between them. Viewed from seaward the land appears very mountainous, but none of the peaks are remarkable except Mount Iniaoan, situated about 8 miles northward of Magapu point. Mount Iniaoan, 5,204 feet high, is fairly conical in shape, well wooded, and easily distinguished.

Selungan point, $3\frac{1}{4}$ miles eastward of Sigayan point, is steep and rocky, and rises to a height of 370 feet one-third of a mile inland; the shore between Sigayan and Selungan points is mostly sand-beach, behind which is a large valley partly cultivated, but for the most part covered with grass and trees.

Magapu point (*Lat. 7° 41' N., Long. 123° 54' E.*), lying about 5 miles eastward from Selungan point, consists of three small steep-to headlands, and is very abrupt, rising to a height of 1,094 feet at $3\frac{1}{4}$ cables inland. It is very prominent and forms a good landmark. The shore between Selungan and Magapu points is alternately sandy and rocky. There are no rivers of any size between the two points.

About half a mile westward of Magapu point there is a small, round, rocky islet, about 75 yards in extent and 44 feet high, with a few trees on it.

Subuan river is a small stream discharging about $2\frac{1}{4}$ miles eastward of Magapu point. It is about 50 yards wide at the mouth, and has about one foot of water on the bar at low water. This river drains a large flat valley between Magapu and Lapitan points, which is cultivated to a considerable extent and inhabited by hostile Moros. Between Magapu point and Tuka bay the coast is almost straight with a beach of sand.

Tuka bay, lying just north-westward of Lapitan point is only about half a mile in extent. The head of the bay is fringed with mangroves, and reefs extend from both sides. The small village of Tuka stands on the bluff near the eastern side of the bay.

Anchorage.—Good anchorage may be found from one to 2 miles westward from Selungan point. Anchorage may be found close in, off the mouth of the Subuan river, in 20 fathoms, and also westward of Magapu point. In most places along the coast between Sigayan

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

and Lapitan points the water is too deep for anchorage, the depths increasing rapidly from 2 fathoms.

Tidal streams.—The flood stream sets north-westward, parallel with the coast, and the ebb sets in the opposite direction.

Lapitan point (*Lat. 7° 39' N., Long. 123° 58' E.*) is rather low and flat, and mostly covered with kogon grass. The shore is rocky with low bluffs. Immediately within the point the land rises to a height of 400 feet, and then slopes gradually back to the mountains, which have a general elevation of about 2,500 feet.

From Lapitan point to Port Baras, about 2 miles eastward, the shore is irregular, and is composed of sand beaches separated by rocky points, behind which it is somewhat hilly and covered with grass and trees.

The small village of Damitan lies on the right bank of a small stream of the same name between Lapitan point and Port Baras; from here a valley extends some distance inland.

Port Baras is about three-quarters of a mile in extent; the middle of the bay is deep, but the head and eastern part are shoal. About 3 miles inland from Port Baras are high, heavily-wooded hills, between which and the shore the land is low and wooded.

Ibus island is a small island covered with cocoanut trees and bushes, forming the eastern entrance point of Port Baras. The tops of the trees are 115 feet above the sea; the southern part is high, with a rocky shore, while the northern part is low with a sandy beach. Shoal water exists between the island and the mainland.

Coast.—From Port Baras the coast trends south-eastward for about $3\frac{1}{2}$ miles to the mouth of the Mataling river, and is low and sandy and intersected by several small streams. It is lined with trees and bushes, and for some 3 miles inland is low. The Mataling river is nearly dry at its mouth at low water.

Malabang.—The town of Malabang lies on the Malabang river, which discharges about half a mile south-eastward from the mouth of the Mataling. It is about three-quarters of a mile from the beach, is very small, and owes its slight importance to the fact of a military post being there at present. There is a sandy road from the beach to the town; the river is only navigable by small pulling boats.

Landmarks.—The Dos Hermanos peaks are two round-topped peaks connected by a saddle lying about 6 miles east-north-eastward from the mouth of the Malabang river. The peaks are about three-quarters of a mile apart north-west and south-east, and rise to heights of 2,671 and 2,707 feet, the south-eastern being the higher. The

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E

fort at Malabang is conspicuous. The northern blockhouse, a white stone tower, is situated 160 yards from the beach on the right bank of the Malabang river; the fort and the northern blockhouse are in line on a N.E. bearing. The southern blockhouse lies about half a mile south-eastward of the northern and about $2\frac{1}{4}$ cables from the beach.

Dangers in approach.—The only danger northward of the usual approach to Malabang is a small shoal with a least depth of $3\frac{1}{4}$ fathoms on it, lying $2\frac{1}{2}$ miles W. $\frac{1}{4}$ S. from the southern blockhouse.

Buoy.—A small dangerous shoal nearly a quarter of a mile in extent, on which the least depth is $1\frac{3}{4}$ fathoms, lies about $2\frac{1}{2}$ miles S. 10° W. from the southern blockhouse, and nearly $1\frac{1}{2}$ miles from the shore. The extreme western edge of this shoal is marked by a red and black horizontally-striped buoy.

A small detached patch of $5\frac{1}{2}$ fathoms lies nearly a quarter of a mile north-eastward of the shoal; between the $1\frac{3}{4}$ -fathoms shoal and the shore reef there is a good channel three-quarters of a mile wide.

Buford reef, covered by a least depth of 2 fathoms, is over half a mile long north-west and south-east, and half a mile wide within the 10-fathoms line. From the centre of the reef the southern blockhouse bears N. 20° E., distant 5 miles. A detached patch of $3\frac{1}{4}$ fathoms lies about two-thirds of a mile northward of Buford reef.

Pinatayan shoal.—**Buoy.**—The Pinatayan shoal is about half a mile long east and west, of irregular shape, and has a least depth of $1\frac{1}{2}$ fathoms over it. From the centre of the shoal, Barrel rock off Matimus point bears S. 77° E., distant $2\frac{1}{2}$ miles. The eastern edge of Pinatayan shoal is marked by a red and black horizontally-striped buoy. The channel between the shoal and Matimus point is 2 miles wide, clear and deep.

Light (*Lat. $7^\circ 35'$ N., Long. $124^\circ 3'$ E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited at an elevation of 36 feet above high water from a white wooden frame structure erected on the spit between the Malabang river and the sea.

Anchorage.—The usual anchorage for Malabang is in 12 or 15 fathoms, about 3 or 4 cables south-westward of the northern blockhouse.

Mooring buoys.—There are two small mooring buoys belonging to the military authorities about $1\frac{1}{4}$ and $2\frac{1}{2}$ cables, respectively, from the lighthouse on the spit.

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Telegraph.—The cable to Parang starts from a cable hut on the beach about $4\frac{1}{2}$ cables south-eastward of the northern blockhouse, and is laid south-westward for 2 miles, then south-eastward.

There is a wireless telegraph station at Malabang ; call letters F A.

Coast.—From the mouth of the Malabang river the coast trends south-eastward for 9 miles to Tetian bay, and is mostly sand, lined with trees and bushes. It is bordered by a steep-to reef, which extends in some places to a distance of half a mile. About 3 miles south-east of the Malabang river is a rocky point with a few outlying rocks, dry at low water ; on the south-east side of the point are a few cocoanut trees. South-east of this point is the mouth of the Lalabuan river, nearly dry at low water, with the small village of the same name on the right bank.

Salauang point is low, sandy, and covered with trees ; reefs extend half a mile off it. Balabagan river and village lie about $1\frac{1}{2}$ miles south-eastward from Salauang point. The land for about 3 miles is low and wooded ; behind this, in the interior, are high mountain peaks attaining an elevation of about 4,000 feet.

Tetian bay, about one mile in extent, affords good anchorage, in 12 to 20 fathoms, especially in the northern part. The northern shore is low and sandy, while the eastern shore is alternate sandy beaches and rocky points. The Matimus river, with a village of the same name at its mouth, discharges near the head of the bay ; its entrance is nearly dry at low water.

Matimus point (*Lat. 7° 27' N., Long. 124° 7' E.*), $8\frac{1}{2}$ miles south-south-eastward from Malabang, is 322 feet high, and wooded, and the shores are rocky, with low bluffs fringed by a narrow reef.

Barrel rock, the largest of three rocks lying about half a cable from Matimus point, is 24 feet high and very steep ; a single tree stands on the summit. These rocks form the western entrance point to Tetian bay, and may be passed at a distance of $1\frac{1}{2}$ cables.

Coast.—From Matimus point the coast trends east-south-eastward for about 3 miles, and consists of sand beaches separated by rocky points, and is fringed by a narrow reef. Inland are hills from 200 to 300 feet high, covered with grass and trees.

Shoals.—About one mile southward from the hill on Matimus point, and at distances of a quarter and half a mile from the shore, are two shoal spots on which the depths are a quarter of a fathom and 4 fathoms, respectively.

General charts 943, 1263.

Plan of Palak harbour on 957. Var. 1° 30' E.

Lalabugan bay, between Matimus and Tugapangan points, is about $1\frac{1}{2}$ miles wide, and extends about one mile eastward. The shores are somewhat rocky, and fringed with a coral reef. In the north-east and south-east parts of the bay are two bights, with sand beaches and a few houses at their heads. Between the bights and northward of them the land is high, and covered with grass and trees. The southern shore of the bay consists of alternate sand beaches and rocky points. The bay is open to the westward, and the water being deep, 20 to 25 fathoms, does not afford any good anchorage.

Tugapangan point, about $3\frac{1}{2}$ miles south-eastward of Matimus point, is clean and steep-to, and may be rounded at a distance of a quarter of a mile. It is 350 feet high, rocky, with low bluffs, and covered with grass and trees.

PALAK (POLLOK) HARBOUR, between Tugapangan point to the north, and Marigabato (Red rock) point to the south-east, $4\frac{1}{4}$ miles distant, is an excellent harbour, but open to the westward; it is, however, protected from the winds of that quarter by Bongo island before the entrance. The harbour is of considerable depth and safe. On the north side it contains the bays of Kidamak and Sugut, and on the south side a wider bay in which are the anchorages of Palak and Parang Parang.

A steep coral reef fringes the coast; on the north side it is very narrow; on the south side it extends from one to 4 cables from the shore; and south of Sugut bay it projects nearly 2 miles to the south-west. The depth at the entrance is over 40 fathoms; within, it ranges from 15 to 25 fathoms; and alongside the fringing reef is about 5 fathoms. The entrance presents no difficulties; a small detached hill at the head of the bay serves as a good mark for vessels bound to Parang.

Light (*Lat. 7° 22' N., Long. 124° 16' E.*).—A red fixed light, visible 7 miles in clear weather, is exhibited from a white framework structure, 30 feet high, erected on a hill about 2 cables E. by S. from the end of the wharf at Parang, east side of Palak harbour.

Kidamak bay.—There is anchorage in the bay in a depth of from 14 to 20 fathoms.

Sugut bay is half filled by a reef; in the northern part there is anchorage in from 10 to 15 fathoms; a village lies on the east and another on the west side.

Parang.—The town of Parang lies on the side of the hill on the eastern shore of the harbour, 150 to 200 feet above the sea, and is conspicuous. There is a military post here. From the foot of the hill an old stone mole with wooden extension

General charts 2578, 943, 1263.

Plan of Palak harbour on 957. Var. 1° 30' E.

projects in a west-south-west direction. Vessels of moderate size can be berthed across the end of the wharf, where there is said to be a depth of 26 feet at low water.

Telegraph cable.—The telegraph cable from Malabang is landed in a small cove on the north side of the Parang mole.

Palak island is a small irregularly-shaped island on the south-side of the entrance to Palak harbour. It is separated from the mainland by Sampinitan creek, a narrow channel with less than 2 feet in it at low water. The northern and eastern sides of the island are bordered by reefs and shoals, and should be given a berth of 4 cables.

Marigabato or Red rock point is clean and steep except on the northern side, where a rocky ledge uncovering at low water extends nearly one cable.

Palak is a small town lying on the eastern side of Palak island. A long stone mole runs off from the northern part of the town in an east-south-east direction, with a depth of 3 feet at the end. A white iron-framed beacon stands on the reef at about $1\frac{1}{2}$ cables E. by N. from the end of the mole. On the south side of the mole, at the inner end, there is a small dry dock; *see* Appendix II.

Anchorages.—Off Parang there is good anchorage for large vessels, about a quarter of a mile from the end of the wharf, in 12 to 14 fathoms of water.

Off Palak (*Lat.* $7^{\circ} 21' N.$, *Long.* $124^{\circ} 13' E.$), anchorage for large vessels may be found on a prolongation of the line of the mole, and about $3\frac{3}{4}$ cables from it, in 17 to 18 fathoms, mud. Small vessels can anchor farther southward and westward, not going much inside of 14 fathoms, as the banks on the south side of the harbour are very steep.

Winds.—In Palak harbour, during the first months of the year, when the wind is well established from the north-east, there are often squalls in the afternoon from the north, accompanied with much lightning, wind, and rain; before the squalls begin the wind blows from north-west and west, and after they are over the land breeze sets in, and lasts until the following morning. During the south-west monsoon the wind freshens after mid-day, and varies from south-west to west and north-west; rain falls in abundance, and heavy thunderstorms occur.

Tides.—It is high water, full and change, at Palak, at 6h. 35m.; springs rise 6 feet, neaps $4\frac{1}{2}$ feet.

There are always two tides in the day, with rare exceptions, which take place in the quarters of the equinoxes when the moon is at her greatest declination.

General charts 2578, 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Directions between Malabang and ports southward.—Vessels leaving the anchorage at Malabang, should steer south-westward until Tugapangan point is well open westward of Matimus point, bearing about S. 39° E. From this position steer for Matimus point, passing westward of the buoy on the $1\frac{3}{4}$ -fathoms patch and eastward of the buoy on the Pinatayan shoal. When approaching near Matimus point, haul off to give it a berth of a mile, and then steer to pass an equal distance off Tugapangan point.

Tidal streams.—The stream turns at high and low water at Palak harbour, and at all the ports on the coast between Samboanga and Palak. On the coast, with a rising tide, the stream sets north, north-west, and west, according to local configuration. At Palak harbour, with the rising tide, the stream sets to the east on the north shore, and follows the bend of the coast to the southward and westward; the ebb stream sets in the reverse direction.

Bongo island (*Lat. 7° 20' N., Long. 124° 2' E.*), off the entrance of Palak harbour, is 6 miles long north-east and south-west, and from three-quarters to 2 miles wide; it is 340 feet high toward the southern end, low in the northern part, and thickly wooded throughout. The island is fringed by reefs, which, on the north-east, north, and north-west sides, extend half a mile off. On the north-west side of the island foul ground extends as much as 2 miles beyond the edge of the shore reef, and this side of the island should be given a wide berth. Limbayan island, small, and 28 feet high, lies on the edge of the reef about three-quarters of a cable from the south end of Bongo island; it forms a good landmark when seen from an east or west direction. There are several small islands lying within a cable of the south-east side of Bongo. There is no good anchorage off the island. The channel between Bongo island and Tugapangan point is 4 miles in width, and free from danger.

Shoal.—A shoal of 6 fathoms with probably less water, the position of which is doubtful, is charted $5\frac{1}{2}$ miles S. 89° W. from the north extreme of Bongo island.

Volcanoes.—The Cordillera de Sugut lies about 20 miles eastward of Palak harbour; the highest mountain of the range is the volcano of Makaturin, the latest eruption of which occurred in 1872. This eruption was followed by an earthquake, which partly destroyed Palak, Kota Bato, and the villages on the banks of the Mindanao river.

Coast.—From Marigabato point, the western extremity of Palak island, the coast trends southward with a slight curve eastward for about $5\frac{1}{2}$ miles to Panalisan point, the northern entrance point of the

General charts 943, 1263.

Chart 2578, E. part of Sulu or Mindoro sea. Var. 1° 30' E.

Kota Bato entrance of the Mindanao river. This part of the coast is low, intersected by several small streams, and bordered by a reef which in some places extends off three-quarters of a mile.

Chart 2575, Eastern part of Célèbes sea.

MINDANAO RIVER, or Rio Grande de Mindanao.

—This great river, the largest in the island of Mindanao, discharges from $5\frac{1}{2}$ to 10 miles southward of Palak harbour by two large and several small mouths. It is navigable by the northern entrance by small sea-going vessels of $10\frac{1}{2}$ feet draught for 5 miles to the town of Kota Bato, and for vessels of $3\frac{1}{2}$ feet draught for 60 miles farther; *see Bar*, below. It flows through a beautiful fertile valley 30 miles in width, which scarcely shows any change of level. The valley is capable of producing tobacco, cacao, sugar, maize, and cotton; but this is only known at present by specimens produced. The course of the river lies south-eastward for 45 miles from its mouth to the Liguasan marsh, whence the direction of the river is north-eastward to its source in the Sugut mountains. At 21 miles from the northern mouth the river divides into two arms, which enter the sea $4\frac{1}{2}$ miles apart, and between them form a great delta. These branches communicate with each other by several small channels. The northern arm is the wider and deeper, and is navigable by small steamers; the southern branch is narrow, and has a depth of only 3 feet on its bar at low water. The river banks are peopled by Moros.

Near the mouths of the Mindanao, and sometimes well out to sea, are found numerous small floating islands composed of grass and floating débris of all kinds, and logs and trunks of trees of considerable size are frequently seen.

Light (*Lat. 7° 15' N., Long. 124° 12' E.*).—A *red fixed* light, visible 7 miles in clear weather, exhibited at an elevation of 25 feet above high water, from a white wooden structure, 29 feet high, marks the shoal water on the southern side of the Kota Bato or northern entrance.

Bar.—On the bar at the Kota Bato entrance, about three-quarters of a mile eastward of the light, there is a depth of only 5 feet at low water, and vessels must await the tide. Small vessels sometimes anchor eastward of the light when waiting for water to cross. There is reported to be from 10 to 14 feet water on the bar at high water, according to the season. The channel in the river is constantly changing.

Landmarks.—Timako island, between the two mouths of the river, is wooded to the water's edge. The hill upon it, Timako, is 760 feet high, very conspicuous, and is a good mark for making the

General charts 943, 1263.

Chart 2575, Eastern part of Célèbes sea. Var. 1° 30' E.

river. Several rocks lie off its northern and western shores. Between the Kota Bato entrance and Timako hill, shoal water extends one mile off the coast.

Mount Kabalata, another excellent landmark, lies $4\frac{1}{2}$ miles southward from Timako hill and $1\frac{1}{2}$ miles from the coast. It is 2,339 feet high, and shaped like a sugar loaf; its slopes are covered with grass and a single tree stands on its summit. From here an elevated range of volcanic mountains, dominated by the central peak Dikalungan, extends some 70 miles to the south-eastward, and for the greater part of this distance lies nearly parallel to the coastline.

Anchorage.—Buoy.—The best anchorage for vessels desiring to communicate with Kota Bato will be found nearly one mile from the shore, in 5 to 20 fathoms, mud, northward of the northern mouth, with Mount Kabalata open westward of Timako hill, S. by W. $\frac{1}{2}$ W., and the southern end of Bongo island bearing W. $\frac{1}{2}$ N.

A black buoy has been placed as a guide to this anchorage, in 4 fathoms, about one mile N. 12° W. from the light-beacon at the mouth of the river. The anchorage is north-westward of the buoy. Vessels must approach with caution, as the water shoals very suddenly.

Directions.—Vessels bound for Kota Bato should bring the light on the south side of the entrance to bear between S.E. by S. and S.S.E., and steer for it; when nearly up to it they should haul eastward, keeping towards the southern shore until abreast of the low mangrove-covered islet about three-quarters of a mile eastward from the light; from here a N.N.E. $\frac{1}{2}$ E. course will lead across the bar in the best water at present (1910).

Kota Bato town (Stone-fort) is a small town lying on the south bank of the northern arm of the Mindanao river, about 5 miles from the sea. A military post is stationed here; the town is connected with Palak harbour by a causeway of stone. The river in front of the town is narrow, and because of the strong current there is considerable difficulty in turning with an ebb tide. There is a small wharf that can accommodate any vessel that can cross the bar. Kota-bato hill is a conspicuous hill rising from level ground to a height of 213 feet, about half a mile southward of the wharf.

South entrance (Lat. $7^{\circ} 12' N.$, Long. $124^{\circ} 10' E.$).—The south entrance to the Mindanao river is situated about $1\frac{1}{2}$ miles south-westward of Timako hill. It is very shoal, the depth being 3 feet at low water with 7 feet inside, and is used only by small native craft. Shoal water extends more than half a mile westward of a line drawn between the two entrance points. There are no aids to navigation.

General charts 943, 1263.

Chart 2575, Eastern part of Célèbes sea. Var. 1° 30' E.

Coast.—From the south entrance of the Mindanao river the coast trends west-south-westward for 7 miles to Tapian point, and is bordered by a reef which is narrow, except for the first $1\frac{1}{2}$ miles, where it is half a mile wide, with deep water at its edge. The land immediately behind the beach is low and covered with cocoanut trees, bushes, and grass. Behind the low land and not far from the coast a range of hills trends in a north-easterly and opposite direction.

Tapian point (*Lat. 7° 8' N., Long. 124° 4' E.*), for about half a mile back from the shore, is low, sandy, and wooded; it is surrounded by a reef reaching out $1\frac{1}{2}$ cables.

Tapian reef, with a least depth of $2\frac{1}{2}$ fathoms, lies less than a mile north-westward of Tapian point. It is little more than a cable in extent, and between it and the shore reef surrounding Tapian point there is a deep clear channel more than half a mile wide.

Coast.—From Tapian point the coast trends in a general south-south-west direction for $21\frac{1}{2}$ miles to Kidipil point, the most western land in this vicinity. For about one mile south-westward from Tapian point the coast is somewhat rocky, with a few detached rocks along the beach; it is very hilly and steep close to the beach. Manangula point, about 3 miles south-westward of Tapian point, is low, sandy, and wooded. A river flowing through a valley discharges about one-third of a mile southward of Manangula point. Southward of the river the beach is low and sandy, and fringed with coral, dry at low water.

The coast southward from Manangula point has not been surveyed, and the information given must be considered as only approximate, and it should therefore be navigated with caution. It is reported, however, to be generally clean and steep-to, with good depths off it.

That part of the coast lying between the Mindanao river and Tuna bay is reported to lie several miles further eastward than charted.

Leno or Linao bay, situated about 9 miles south-eastward of Kidipil point, is $1\frac{1}{2}$ miles wide, and sheltered from all winds but those from the south-west. Its shores are bordered by a narrow, steep reef. The anchorage here is in a depth of from 7 to 12 fathoms.

Huidobro reef, called Linao shoal by the Moros, is placed on the chart 3 miles W. by S. of the western entrance point of Linao bay; it is said to be covered by a depth of $3\frac{1}{2}$ fathoms. A late report states that it lies 2 miles south-westward of Linao point.

Plan of Port Lebak on 957.

Port Lebak, about 11 miles south of Linao bay, between Points Lebak and Nara, is easy of access, and offers good

General charts 2575, 2576, 943, 1263.

Plan of Port Lebak on 957. Var. 1° 30' E.

shelter in all weathers, but a sea sets in with westerly winds; at its north-east corner is a native village. A reef extends $1\frac{3}{4}$ cables south-westward from Lebak point with Lebak point island near its extremity; the entrance between the reefs is half a mile wide, with deep water. The shores are covered by mangroves and bordered by a reef which extends to about one cable from them. There is an islet, Tubotubo, in the southern part of the port, surrounded and connected with the shore by a reef. The depths in Port Lebak are from 6 to 30 fathoms.

Anchorage.—The best anchorage is in a depth of 11 to 13 fathoms on the southern side of the port, eastward of Tubotubo islet and reef. There is also anchorage in 13 fathoms in the bight eastward of Lebak point, north side of the port, but the depth decreases quickly towards the shore.

Water can be obtained in the River Lebak, east of the anchorage, and also from the other rivers in the port. The natives are said to be in the habit of using poisoned arrows on the smallest pretext; it is therefore well to be careful, and not trust them too far.

Shoal (*Lat. 6° 33' N., Long. 123° 56' E.*).—A shoal of $2\frac{1}{2}$ fathoms has been reported as lying about 4 miles westward of Lebak point.

Plan of Basiauang bay on 957.

Basiauang bay, about 4 miles southward of Port Lebak, presents two anchorages; that on the northern side of the bay, east of Basiauang point, has $2\frac{3}{4}$ to 11 fathoms in it, and affords good shelter in all weathers, but it is necessary to secure to the shore, as there is not sufficient room for a vessel to swing. The southern anchorage, with depths of 10 to 25 fathoms, is off the mouth of a small creek on the northern side of a remarkable hill, connected with the mainland only by a low mangrove-covered neck. The anchor can be dropped in a depth of 10 to 13 fathoms, and the stern secured to the reef. The reefs at the point, and the neighbouring island of Donauang, break the sea; these anchorages of Basiauang, after Port Lebak, afford the best shelter on this coast in all weathers.

Donauang island, lying westward of the south entrance point of Basiauang bay, has a reef which reaches 2 cables out to the north-north-west. The passage between Donauang and the coast is about one cable wide between the reefs, and is safe; a vessel should keep nearer to the island reef than that off the coast, which is more extensive.

Chart 2575, Eastern part of Célèbes sea.

Donauang shoals are two shoals situated, respectively, 3 miles N. 9° W. and 2 miles N. 3° W. from the north point of Donauang

General charts 2575, 943, 1263.

Chart 2575, Eastern part of Célèbes sea. Var. 1° 40' E.

island; they are each about half a mile across and covered by $3\frac{3}{4}$ fathoms least water.

Tuna bay, about 8 miles south-eastward from Basiauang bay, is semicircular, steep-sided, and bordered by a reef, like all the bays of this coast. There is anchorage in a depth of 15 fathoms in the north-west part, before coming to a point covered with mangroves from which a reef projects; a small anchor should be laid out on the reef, and it is well to do this in all these bays with steep sides.

Coast.—From Tuna bay the coast trends southward for 5 miles to Malatuna point, and then south-eastward for about 17 miles to Pola point.

Kanipan bank, a reef which uncovers in places, and has a depth of 5 fathoms in other parts, lies 2 miles off the coast, and 5 miles south-eastward of Malatuna point. Vessels should not approach this part of the coast within a distance of 6 miles.

Coast.—Pola point, 17 miles south-eastward of Malatuna point, is low, with a sand beach and small reef. Off it is a small sandbank, above water, about one mile from the point. At about 5 miles eastward of Pola point lie Kraan river and village, near which layers of coal have been found. Off the mouth of the river the water is discoloured for some distance off-shore, but this is due to the water from the river, and there is deep water within half a mile of the entrance. Three miles east of the mouth of Kraan river, there is anchorage in a depth of 15 fathoms, off a river where fresh water may be obtained. As far as Sarangani bay, the coast is generally low and offers no good shelter.

Bukud point (*Lat. 5° 57' N., Long. 124° 36' E.*), formed by the hill of the same name, lies 19 miles east-south-east of Pola point, and terminates in an islet united to it by a narrow reef. The hill may be easily recognised, being isolated in low land; seen from the west it suggests the form of a table.

Shoal.—A shoal with a depth of 6 feet is reported to lie about $3\frac{1}{2}$ miles south-eastward of Bukud point and about $2\frac{1}{2}$ miles off-shore; it is about 3 to 4 cables in extent, and has depths of from 3 to 7 fathoms around it, beyond which it is steep-to. As other dangers may exist, the coast should be given a good berth.

Bua (Bual) point, 20 miles east-south-eastward of Bukud point, is surrounded by reef which is said to extend out to the distance of one mile. The charts hereabouts are said to be very inaccurate.

A reef, 2 miles long and one mile wide, covered by 5 fathoms water, lies off the coast eastward of Bual point, and $3\frac{1}{2}$ miles S.W. by W. $\frac{1}{2}$ W. of Bulaluan point, the western point of Sarangani bay.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

Four small reefs, on which the least known depth is $1\frac{1}{2}$ fathoms, lie about $1\frac{1}{2}$ miles southward and south-westward from Bulaluan point. They extend about $1\frac{1}{2}$ miles east and west, and are separated from the shore and from each other by deep water.

SARANGANI BAY has a width of 6 miles at its entrance between Bulaluan and Sumban points; its sides are very steep, and its depth considerable. Anchorage may be found in the bights of its coast-line, but close in, and with a hawser out to the shore to prevent the anchor slipping into deep water. A coral reef, extending one mile out, surrounds Bulaluan point, and borders the western and northern shores of the bay. The west coast is arid, the plains to the north-west and north are covered with kogon and abound in deer.

Mount Matutum, which lies 20 miles N. 13° W. of the town of Mutul in the north-west angle of the bay, is 7,524 feet high, and can be seen from a great distance.

Mutul anchorage is in the north-west angle of the bay in a depth of 15 fathoms, with moorings to the shore. Good water can be obtained from the Mutul river.

Plan of Kanalasan cove on 957.

Kanalasan cove (*Lat. $5^{\circ} 48' N.$, Long. $125^{\circ} 11' E.$*), though steep, is the best anchorage in Sarangani bay during the south-west monsoon; it lies east of Sumban point, before the village of Glan, and has depths of from 2 to 30 fathoms. The southern shore of the cove is bordered by a shoal bank, one cable wide in the eastern part, and a quarter of a mile wide in the western. Anchorage may be had in a depth of 11 to 13 fathoms, with a hawser secured to the shore; but it is not advisable to anchor before the mouth of the River Glan, which flows into the eastern part of the cove, on account of the freshets. There is also anchorage in the western part of the cove near the edge of the shoal bank, at a quarter of a mile from the shore. The village of Glan stands on the bank of the river, near its mouth. Good water can be obtained from the river.

Sumban point is high and steep, with but little vegetation on it; the point is surrounded by a reef extending $2\frac{1}{2}$ cables to the west and north.

Chart 2575, Eastern part of the Célèbes sea.

THE SOUTHERN PENINSULA of MINDANAO, between Sarangani bay and the Gulf of Davao, is elevated, and has several remarkable peaks on it; the southern hill, 1,670 feet high, and in reality round, looks somewhat like a pyramid when seen on an east-south-east or west-north-west bearing. Five miles north-eastward

General charts 2575, 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

of this round-topped hill is Saddle peak, elevated 3,600 feet above the level of the sea; and north-north-east of Saddle peak there is a range, the highest peak of which, distant 13 miles, attains the height of 4,520 feet, and has a conical top when viewed from the southward.

The west coast, from Sumban point to Tinaka point, is generally clean, except near Bluff point, where the reef extends nearly a mile out. A shoal of $4\frac{1}{2}$ fathoms is charted about 2 miles south-south-westward of Bluff point. Tukapanga point is rocky, high, and steep; a reef follows the coast from it, round the south end of the peninsula as far as Butulan cove.

Tinaka point (*Lat. 5° 33' N., Long. 125° 20' E.*), the southern extremity of Mindanao, consists of two headlands connected by a semi-circular beach. It is clean and steep-to, and may be passed at a moderate distance; to the east-south-eastward of the point there is a large shoal of sand and rock, covered by a depth of $5\frac{1}{2}$ fathoms.

Anchorage.—On the western side of Tinaka point there is a small bay, Batulaki, about 6 cables wide and 5 cables deep, open to the south-west, and fringed by shoals which considerably reduce the available space, in which there is a depth of 9 fathoms, lessening gradually to 3 fathoms, over a clean sandy bottom. Safe anchorage, in from $3\frac{1}{2}$ to 7 fathoms, may be found in this bay, sheltered from the north-east monsoon. Balangunan cove, to the eastward of Tinaka point, is exposed to the sea, and affords very indifferent anchorage. Malavinuan cove, about one mile eastward of Balangunan cove, is similar in size and shape to Batulaki cove, and affords sheltered anchorage in the north-east monsoon in from 12 to 16 fathoms.

The coast.—Gual point, the most south-easterly part of the peninsula, is low and sloping, with a little reef off it. Kamalian cove, on the north side of Gual point, offers a deep, bad anchorage. The coast between Kamalian cove and Silakay point is foul.

Butulan cove, northward of Silakay point, is semicircular, nearly one mile wide, and half a mile deep. It offers temporary anchorage out of the swell, but exposed to the sea that sets in from cross tides. The depth is great, with 14 fathoms almost touching the shore, and 10 fathoms before the mouth of the river.

The coast continues clean and sloping, and almost straight, to Banos point, which is about 72 feet high and peaked. From here it runs north-north-eastward, with a series of high points, to Kalian point, which is broad and rather remarkable. There is good anchorage off Kalian point, either north or south of it.

Tides and tidal streams.—It is high water, full and change, at Tinaka point, at 7 hours; springs rise 6 feet. The flood stream

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

sets to the west between Tinaka point and the Sarangani islands, and the ebb to the east. On the coast to the northward and eastward it is said that the flood stream sets to the north, and the ebb to the south, the latter being less violent than the flood; also that to the northward of Kalian point the tidal streams are weaker. Strong tide races and violent eddies are prevalent off Banos point.

SARANGANI ISLANDS consist of two islands and a sand cay, situated 7 miles from the south point of Mindanao. The islands are separated by a deep channel $1\frac{3}{4}$ miles wide, reduced by a reef on the east side of Balut island to a navigable passage $7\frac{1}{2}$ cables in width. In this channel the tidal streams are very strong, the flood stream setting north and the ebb south. A shoal, covered by 7 fathoms, lies nearly in mid-channel, three-quarters of a mile from the coast of Sarangani.

Balut island (*Lat. 5° 24' N., Long. 125° 23' E.*), the westernmost of the two, is the higher and better cultivated. In the centre is a volcano, from which smoke sometimes issues, elevated 2,775 feet above the sea; seen from the north-west it appears between two peaks. Near the south-western point there is another volcano, and towards the south-east a hill 1,083 feet high. The north and east coasts are bordered by a reef, which in some places extends out over a mile, while on the south and west sides the fringing reef does not extend nearly so far. Off the south-west end is a rock, 40 feet high, named Manamil islet. Lajan point, the north-east point of the island, is low and covered by mangroves; about $1\frac{1}{2}$ miles to the south of the point there is anchorage in a depth of 13 fathoms, sheltered from the south-west, but exposed to the sea from the north-east; this is the only anchorage in the island. There is a hot spring on the shore here, covered at high water.

Sarangani island is composed of small undulating hills 490 to 820 feet high, covered with vegetation. There are three sheltered creeks on the west coast; the east coast is very foul.

Port Patuko, close to the north extremity of the island, offers sheltered anchorage for small vessels in a depth of from 4 to 7 fathoms; the stern of the vessel should be secured to the shore. The entrance may be recognised by a cliff of red earth a little to the northward of it; the channel is narrowed by reefs on both sides. Tiain point, one mile south-west of the entrance to Port Patuko, may be recognised by white lime stains upon it; it can be approached with safety. A detached patch, with $4\frac{1}{2}$ fathoms on it, lies N. 10° W., half a mile from Tiain point, and westward of the entrance of Port Patuko.

General charts 943, 1263.

Plan of Port Tumanao on chart 2575. Var. 1° 40' E.

Port Tumanao, one mile south of Tiain point, has a depth of 25 fathoms at the entrance, diminishing to 5 and 9 fathoms at the head. The northern entrance point, which is bordered by a reef to a distance of a quarter of a mile, may be recognised by a conspicuous white mark in the rocky bluff. Good anchorage for small vessels may be found in 15 fathoms, about a quarter of a mile from the head of the port, which is open to the westward. Water can be obtained from a small rivulet in the south-east part of the port.

The rise of tide in Port Tumanao is about 8 feet.

Plan of Port Bolai on chart 2575.

Port Bolai (Lat. 5° 26' N., Long. 125° 26' E.), 1½ miles southward of Port Tumanao, extends 6 cables eastward, and for the outer half of its length is about one cable wide, with depths of 11 fathoms in the entrance and from 4½ to 10 fathoms inside; the bottom consists of sand and stones. The port is only fit for very small craft; neither wood nor water can be obtained. The anchorage depths are from 2 to 8 fathoms.

The rise of tide at Port Bolai is about 6 feet.

Chart 2575, Eastern part of Celébes sea.

Olanivan islet is a small flat cay, about a quarter of a mile across, with trees on it, and 60 feet high, lying one mile northward from the north point of Sarangani island; it is surrounded by a coral reef with a depth of 7 fathoms off its south-west edge. Between this reef and that fringing the north point of Sarangani is a narrow channel, which appears to be navigable.

GULF OF DAVAO.—The Gulf of Davao has its entrance between Kalian point to the west and Cape San Agustin to the east, some 30 miles apart, and extends about 70 miles to the northward. Samal and Talikud islands largely occupy the northern part of the gulf. The shoals that fringe the western shores do not extend beyond 1½ miles, but in the eastern part of the gulf, between Sigaboy island and Arena point, dangerous detached shoals and reefs lie from 3 to 4 miles from the shore, and there is much foul ground at a less distance. The waters of the middle of the gulf are deep and clear.

West shore of Davao gulf.—From Kalian point the coast trends north-north-westward for 25 miles to Tubalan head. The villages of Talugutan, Lais, Malita, and Lakaron lie on this stretch of coast; the three last named are ports of call for the mail steamers. Nearly the whole of this part of the coast is unsurveyed, and very little is known respecting it, but from Lais northward it is reported to be mostly sand, with mangroves in places, and clean except off the points, which send off reefs.

General charts 2575, 943, 1263.

Chart 2575, Eastern part of Célèbes sea. Var. 1° 40' E.

Tubalan head (*Lat. 6° 30' N., Long. 125° 36' E.*), forming the eastern side of the port of the same name, is a gently rounded hill 558 feet high, and is conspicuous; the isthmus connecting the hill with the mainland is low, giving it the appearance of an island when seen from a distance. The north-eastern and eastern sides of the headland are clean and steep-to, with no out-lying dangers; from the north-west part of the headland a reef extends about $1\frac{1}{2}$ cables.

Coast.—From Tubalan head the coast trends north-westward for 13 miles to Kolapsin point, at the entrance to Malalag bay, and is more indented than the other shores of the gulf. From one to 3 miles inland are numerous and usually sharp peaks, from 600 to 1,400 feet high. Several miles further inland, and separated by pronounced valleys, are peaks ranging from 1,600 to probably 4,000 feet in height; these interior peaks are generally covered with clouds. The whole system is a more or less confused mass, making it difficult to distinguish particular peaks. The whole area is heavily wooded, but with timber of no great value.

Port Tubalan is over three-quarters of a mile wide at the entrance between Tubalan head and Botak point. The middle of the bay is deep, and the shores are fringed with coral. Basol islet is a steep rocky bluff with a few bushes on top, lying on the reef in the south-eastern part of the bay. The depths in the bay are from 3 to 35 fathoms.

Anchorage.—The best anchorages in Port Tubalan are in the western corner of the bay in 20 or 22 fathoms, mud, and in the south-east corner in 22 to 24 fathoms, mud, with Basol islet bearing S. 67° E., distant a quarter of a mile.

Botak point, on the north side of the entrance to Port Tubalan, is 361 feet high, and slopes quickly to a rocky bluff 40 feet high at the extremity. The sides of the point are fringed with narrow reefs, but the end is clean and steep-to.

Basiauan bay, $4\frac{1}{2}$ miles from Tubalan head, is $2\frac{1}{4}$ miles wide at the entrance between Sigarin and Sibalatan points, and extends $1\frac{1}{2}$ miles south-westward. Sigarin point, the south-eastern entrance point of the bay, ends in a bluff 80 feet high, and is bordered by a reef with foul ground beyond it to a distance of a quarter of a mile. The middle of Basiauan bay is deep and clear, but the shores are fringed with reefs extending a quarter of a mile off in places. The depths are from 5 to 30 fathoms. The village of Basiauan lies at the head of the bay.

Anchorage.—The best anchorage in this vicinity is found at the head of Basiauan bay, north-eastward of the village, in 14 to

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

16 fathoms, mud, sheltered from all winds except those between north and north-north-east. The reef extending a quarter of a mile from Tambalan point, on the east side of the bay, dries at low water, but those on each side of the anchorage have one foot of water on them at low water, and are mostly dark coloured. The approach to the anchorage is free from danger with the exception of the shore reefs.

Sibalatan point, the north-western entrance point of Basiauan bay, is not remarkable from up or down the gulf, but is easily recognised from the north-eastward, the point ending in a ridge over 200 feet high, that terminates in a curving embankment pointing southward. The point is surrounded by a reef with foul ground outside it to a distance of a quarter of a mile.

Shoal.—A small rocky shoal, with a least depth of 2 fathoms on it, lies about $1\frac{3}{4}$ miles N. by W. $\frac{1}{2}$ W. from Sibalatan point.

Kulungan point (*Lat. 6° 36' N., Long. 125° 30' E.*), lying nearly $3\frac{1}{2}$ miles north-westward of Sibalatan point, may be easily recognised by a sharp tongue of bare, rocky yellow bluff running several hundred yards northward down to the water's edge. The point is surrounded by a reef, but may be passed at a distance of a quarter of a mile.

Between Sibalatan and Kulungan points are two bays, the eastern of which is clear, with depths of 4 to 20 fathoms, but the shores are lined with coral; Kulungan bay, the western, is foul, with several shoals, some of which are awash at low water.

The coast north-westward of Kulungan point as far as Kolapsin point, a distance of about 4 miles, is bold and rocky, with stretches of sand-beach and a narrow fringe of reef. Cliff point, nearly midway, is 390 feet high, clean and steep-to.

Kolapsin point, the north-east extremity of the peninsula forming the northern side of Malalag bay, rises to a height of 423 feet; it is fringed by a coral reef which extends nearly 2 cables north-eastward. There is a small shoal covered by a least known depth of $3\frac{1}{2}$ fathoms lying about 6 cables N. 25° E. from Kolapsin point, but there may be coral heads on it with less water.

Malalag bay, situated in the south-west part of Davao gulf, is about 4 miles long, south-east and north-west, and one mile wide. It is clear and deep, and affords good anchorage in from 10 to 30 fathoms, sheltered from all winds. It is surrounded by high hills; on the west side, and also at the head of the bay, are extensive mangrove swamps.

General charts 943, 1263.

Chart 2575, Eastern part of Célèbes sea. Var. 1° 40' E.

The shores are fringed by narrow, steep-to coral reefs, and at the head of the bay there is considerable shoal ground, with an islet 60 feet high on its western extremity.

The village of Bolton lies on the south shore of the bay facing the entrance.

The eastern entrance point to Malalag bay is 189 feet high and surrounded by a coral reef, the western extremity of which lies $3\frac{3}{4}$ cables S. 58° W. from it. This point is situated about half a mile W.S.W. from Kolapsin point.

Mount Piapi is a heavily-wooded hill, 640 feet high, lying close to the beach on the western side of the entrance. It is a good landmark being distinguishable from a considerable distance.

Dangers.—Piapi reef, which dries one foot at low water, lies nearly $1\frac{1}{4}$ miles N. 76° E. from the point at the foot of Mount Piapi, and a shoal patch lies $1\frac{1}{4}$ cables eastward of this reef; the western shore of the entrance to the bay is fringed with mangroves, and is fronted by shallow water to a distance of three-quarters of a mile, leaving a deep channel, one mile wide, into the bay. This channel is clear, with the exception of Bolton reef; *see* below.

Bolton reef.—Beacon (*Lat. $6^{\circ} 37'$ N., Long. $125^{\circ} 25'$ E.*).—Bolton reef is small, and covered by a least depth of 3 feet. It lies in the middle of the entrance, and divides it into two channels, the western being the wider and better. It lies $1\frac{1}{4}$ miles westward from Kolapsin point, has deep water around it, and is marked by a concrete beacon, which stands in 11 feet of water and is 17 feet above the sea.

Light.—A *red fixed* light, elevated 32 feet above high water, and visible 7 miles in clear weather, is exhibited from a white post, 26 feet high, erected on the beach in front of the village of Bolton.

Immediately under the lantern there is a large white triangular day-mark, that can be seen from outside the reefs at the entrance to the bay.

Anchorage in 10 fathoms, mud, will be found in front of Bolton, about a quarter of a mile from the shore. Small vessels may anchor closer in, but should approach the anchorage cautiously, as the shore bank is steep.

About one mile eastward of the village, just round a rocky bluff, is a fine sand-beach, which for a short distance has no coral off it and deep water close-to. Vessels of any size can anchor close-in here.

Vessels entering for shelter will find good anchorage, in about 20 fathoms, between the islet near the head of the bay previously mentioned and the north shore.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

Directions.—Vessels entering Malalag bay should bring the light to bear S. 11° W. and steer for it. This course should lead about a quarter of a mile eastward of the reefs off Mount Piapi, and 1¼ cables westward of the beacon on Bolton reef; having passed the latter there are no other dangers.

Vessels bound into Malalag bay from the eastward should bring Mount Piapi (*Lat. 6° 38' N., Long. 125° 23' E.*) to bear W. by S., and steer for it until the eastern entrance point bears South, when the course should be altered south-westward, passing westward of Bolton reef at a distance of not less than a cable; having passed this danger, the vessel should be hauled southward for the village of Bolton, and anchorage taken up as previously described.

Coast.—From Mount Piapi the coast trends N. by E. ½ E., with a curve westward, for 15 miles to Malusi point, thence north-eastward with a curve north-westward for about 15 miles, to the entrance of the Davao river. The land in the immediate vicinity of the coast is low, but rises rapidly to a mountain range, culminating in Mount Apo, 9,662 feet high. This section of the coast is heavily wooded, and intersected by a number of small streams, none of which are navigable by steam launches, and which are difficult to enter with a pulling boat at low water. The shores are fringed with reefs, and in some places detached reefs lie from one to 2 miles from the shore. The anchorages are poor, and in many cases difficult of access on account of off-lying reefs.

Umbakanan and Padada rivers discharge at 1½ and 3 miles, respectively, northward of Mount Piapi. On the shore reef, about midway between the entrances to these two rivers, and 2 cables from the coast, is a mangrove island, which is a good landmark.

Padada village lies on the left bank of the river of that name, about half a mile inland. From the Padada river the coast trends northward 4 miles, to Digos point, and is fronted by a sand-beach fringed with coral not more than a quarter of a mile in width. The Bulatakay and Digos rivers discharge about 2¾ miles and one mile, respectively, south-south-westward of Digos point. The small village of Digos lies on the north bank of the river of that name, about half a mile inland.

A large iron warehouse on the beach, about a quarter of a mile southward of the Digos river entrance, forms a good landmark.

Digos islet is a white coral sand cay about 2 feet above high water, with a few bushes on it. It stands on a reef about 3½ cables eastward of Digos warehouse, and about one mile southward of Digos point; the reef is partly dry at low water, and extends 1½ cables eastward of the islet.

General charts 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 40' E.

Shoal.—About $1\frac{1}{4}$ miles southward from Digos warehouse, and nearly 4 cables off-shore, is a detached shoal, with 3 fathoms on it.

Digos anchorage.—Anchorage in 12 or 15 fathoms may be found southward of Digos islet, with the warehouse bearing N.W., distant a quarter of a mile, or northward of the same islet with the warehouse bearing W.S.W., distant nearly 4 cables, in 11 or 12 fathoms. Small craft may anchor between the islet and the warehouse.

Digos point (*Lat. 6° 45' N., Long. 125° 24' E.*) is low, flat, and wooded, fringed with mangroves and surrounded by a reef which dries at low water to a distance of a quarter of a mile.

Digos reefs lie north-eastward, eastward, and south-eastward of Digos point, and some parts of them dry at low water; a north and south line passing $1\frac{1}{2}$ miles eastward of the point leads eastward of them. There is a narrow deep channel, little more than a cable in width, between the shore reef and Digos reefs, and several channels between the reefs which can be used with local knowledge. Digos Outer reef, the south-eastern danger, is awash at high water. This reef is steep-to on the east and south sides, but on the west side foul ground extends nearly half a mile.

Directions for Digos anchorage.—When the warehouse at Digos bears N. 30° W., distant $1\frac{1}{2}$ miles, or Digos point bears North 2 miles, either may be steered for; this course will lead westward of the foul ground extending westward from Digos Outer reef. If intending to anchor southward of Digos islet, it should be brought to bear N. 2° W., and steered for until the warehouse bears N.W., when proceed towards it and anchor as previously recommended. If intending to anchor northward of the islet, it should not be rounded too closely on account of the reef extending eastward from it.

Tagabuli bay, about $2\frac{1}{2}$ miles northward of Digos point, is not readily made out from seaward, the shore line being all mangroves. It extends nearly 9 cables north-westward, with a width of about $2\frac{1}{2}$ cables and a depth of from 12 to 22 fathoms, and the shores are bordered by reefs, dry at very low water. Anchorage, protected except from east-south-east winds, may be had in the middle of the bay in from 16 to 20 fathoms, mud, where there is a width of 2 cables between the reefs.

Santa Cruz point, lying $2\frac{1}{2}$ miles north-eastward of Tagabuli bay, is low and wooded; the shore between is fronted by reefs covered with white coral sand, which can be seen from a considerable distance. Santa Cruz village, situated on the point of that name, is small and obscured from seaward by trees.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

Light (*Lat. 6° 49' N., Long. 125° 25' E.*).—A red fixed light, elevated 28 feet above high water, and visible 7 miles in clear weather, is exhibited from a white frame structure, 22 feet high, situated near the beach, just south of Santa Cruz point. The light kept on a N.W. bearing leads to the anchorage.

Anchorage.—Vessels usually anchor about $1\frac{1}{2}$ or 2 cables south-eastward from Santa Cruz light, in from 7 to 20 fathoms of water.

Better-protected anchorage may be found in a cove about one mile north-eastward from Santa Cruz, in 17 or 18 fathoms, mud, inside a reef which dries at half-tide; this anchorage is protected from all except strong south-east winds.

Landmarks.—About $1\frac{1}{2}$ miles northward of Santa Cruz point are two conspicuous patches of kogon grass extending in a horizontal line at an elevation of from 600 to 800 feet, and about 3 miles west-north-west of Santa Cruz at an elevation of 1,200 to 1,500 feet there is another patch of kogon grass. These patches can be seen at a considerable distance, and form good landmarks.

Mount Apo, situated about 13 miles N.W. from Santa Cruz point, is 9,662 feet high, and appears as a peak with steep slopes and rounded summit; a small crater is reported to be in the summit. On the south side and about 1,000 feet below the summit, a part of what was evidently once a crater seems to have been blown away. There are several fissures from which sulphur steam has been seen issuing. Mount Apo and the surrounding peaks are constantly enveloped in clouds from March to June. View *a*, at page 700.

Malusi point, 3 miles north-eastward of Santa Cruz point, is low, rounding, and not very prominent. The shore between the two points forms a bay, the shores of which are fringed with coral. The land rises rapidly to a height of 2,500 feet within one mile of the coast. There are a number of reefs in the bay, between which and the shore anchorage may be found.

Tagulaya point, $3\frac{1}{2}$ miles north-eastward of Malusi point, is low, wooded, and surrounded by a narrow gravel beach. At the head of the bay between the two points is the village of Astorga, with 700 inhabitants. Part of the shore near Astorga is lined with mangroves, in front of which, and for a quarter of a mile on either side, is a fringe of broken coral, but the rest of the bay is bordered by a fine sand-beach, from 10 to 20 yards wide, which is extensively used as a road. The land in the interior is heavily wooded. There is anchorage off Astorga in 6 to 11 fathoms, sheltered by reefs.

Shoals.—In the bay in which Astorga is situated there are several detached shoals, and a little more than half a mile outside a

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

line drawn between Malusi and Tagulaya points is a broken chain of shoals covered by depths of from one to 4 fathoms. They begin about $1\frac{1}{2}$ miles south-westward from Tagulaya point, and extend about 2 miles in the same direction; they are composed of sand and coral, and are generally visible.

At $1\frac{1}{2}$ miles N.N.E. from Tagulaya point and three-quarters of a mile from the shore there is a small shoal covered by a least depth of 4 fathoms, and surrounded by deep water.

Coast.—From Tagulaya point to the entrance of the Siraoan river, 4 miles northward, the coast is wooded to a broad sandy beach. The village of Daron lies on the shore about a mile northward of the point, and may be recognised by a large and conspicuous greenish-white house with a galvanised iron roof, which is visible from a distance of 8 to 10 miles. The Siraoan river has 5 or 6 feet on its bar at low water, but is not navigable for a ship's launch for more than half a mile. The village of Siraoan is very small, with not more than 200 inhabitants.

Daliaon.—The village of Daliaon, at the mouth of the river of the same name, about $1\frac{1}{2}$ miles north-eastward from Siraoan has a church, several stores, a few good wooden houses, and a population, in 1903, of 232.

Light (*Lat. 7° 0' N., Long. 125° 31' E.*).—A red fixed light, elevated 37 feet above high water and visible 7 miles in clear weather, is exhibited from the roof of a storehouse, 33 feet high, about 200 feet from the beach at Daliaon.

Anchorage.—Daliaon anchorage has depths of from 4 to 20 fathoms. The usual anchorage is in from 7 to 10 fathoms, with the light bearing W. by N.

Daliaon reefs are two coral reefs which extend over one mile in a north and south direction. The northern reef, which begins about half a mile southward of Daliaon, is partly dry at low water; the southern reef, with very little water on it, has a rock awash at low water at its northern end. Between these reefs and the shore there is a deep channel about 150 yards wide at the narrowest part.

A small detached shoal of $4\frac{3}{4}$ fathoms lies nearly a quarter of a mile northward of the north end of Daliaon reefs, and more than that distance from the beach.

Coast.—Between Daliaon and Dumalag point, $4\frac{1}{2}$ miles east-north-eastward, the coast recedes $1\frac{1}{2}$ miles northward, forming a large bay which is deep and clear. The villages of Lipadas, Dumuy, and Matina lie on the shore of the bay, into which a number of small streams discharge. The shore is generally bordered by sandy beaches, and

General charts 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 30' E.

there is very little coral. The land is low, level, heavily wooded, and covered with jungle to the water's edge. Off Matina there is anchorage in 10 to 12 fathoms, open to the southward.

Dumalag point is the most conspicuous point in this vicinity, projecting as it does nearly one mile southward from the general coast line. It is mostly low and well wooded. Dumalag island, forming the southern end of the point, is about 3 cables long, and separated from the rest of the point by an opening only passable by small boats. The southern end of the island is surrounded by coral, which dries out one cable.

Shoals.—At about 6 cables south-south-eastward of the south end of Dumalag island is a small shoal of $5\frac{1}{2}$ fathoms, and about one-third of a mile S. 74° E. from the same point there is another small shoal of 4 fathoms. With the exception of the above shoals, Dumalag point may be passed within a quarter of a mile.

Coast.—From Dumalag point the coast trends north-eastward for about 3 miles to the entrance to the Davao river, and is low, swampy, and bordered by a sandy beach. Shoal water extends to a distance of about a quarter of a mile, beyond which the depth increases rapidly.

Davao river has a depth of only 2 or 3 feet on its bar at low water, with 5 to 6 feet inside, and the channel changes frequently in freshets. In 1907 the channel was along the south shore, and was marked by stakes. The sandy point at the south side of the entrance was being rapidly cut away, and was being deposited on the north side, forming a large flat, with lodged tree trunks and minor drifts.

Anchorage.—Beacon.—An iron frame, from which a light was formerly exhibited, has been left standing on the northern side of the river entrance, to form a mark for the anchorage. The anchorage off Davao is very bad, the water being deep close up to the bar. Vessels desiring to anchor off the mouth of the river should bring this beacon to bear N. 2° W. and stand in slowly for it, anchoring as soon as 17 fathoms, mud and sand, is obtained. This is the only place where a vessel can anchor and have sufficient swinging room to clear the bank. There are said to be depths of 4 to 10 fathoms in Davao anchorage.

Pier (*Lat. $7^{\circ} 4' N.$, Long. $125^{\circ} 38' E.$*).—About one mile north-eastward of the mouth of the Davao river there is a pier about 800 feet long and 20 feet wide, with a depth of from 20 to 28 feet at the end. The main part of the pier runs about east and west, with an arm at the end, 150 feet by 30 feet, projecting southward. Between the pier and the town there is a good road.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

Light.—A red fixed light, elevated 38 feet above high water, and visible 7 miles in clear weather, is exhibited from a white framed structure, 30 feet high, at the southern end of the arm of the pier. Vessels from the southward, when in the immediate vicinity of this light, should not bring it to bear northward of N. 30° W.

Davao, a small town of rising importance, situated on the north bank of the Davao river, close to its mouth, was founded in 1847. It maintains regular steam communication with Manila and other ports of the Archipelago, but is not a port of entry for foreign commerce.

Tides.—It is high water, full and change, at Davao, at 6h. 23m.; springs rise $5\frac{1}{2}$ feet. The stream turns nearly at the time of high and low water. At Davao there are two high and two low tides daily, affected however by diurnal inequality both in time and height. See Appendix, page 719.

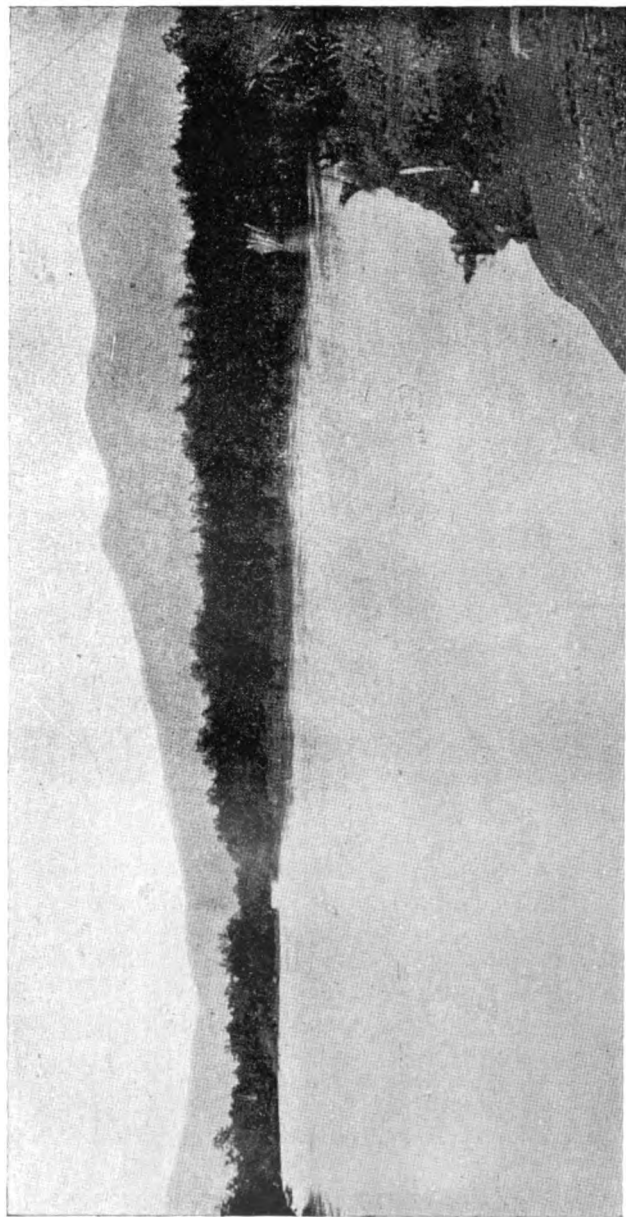
Coast.—From the northern entrance point to the Davao river the coast trends north-eastward for $4\frac{1}{2}$ miles to Lanang point, and is sandy, with broad sand flats exposed at low water, the outer edges of which are steep-to, and there is a rocky detached shoal with 2 fathoms over it nearly half a mile from the beach. The country behind the beach is low and heavily wooded.

Samal island (*Lat. 7° 0' N., Long. 125° 45' E.*) lies near the head of Davao gulf and close to the western shore, from which it is separated by Pakiputan strait. It is about $18\frac{1}{2}$ miles long between Bassa point, the northern end, and Paet point, the southern, and has a greatest width of about 8 miles between Linao and East points, the western and eastern extremities of the island. The highest hills are in the eastern part of the island, the greatest elevation being 1,700 feet, about 3 miles southward of East point. It is thinly inhabited, no villages being found on the east coast and very few on the west. A few small streams are on the west side of the island. The eastern coast is clean and steep-to; on the western side, near the middle, shore reefs extend half a mile, and there are also detached shoals in this vicinity, none of which lie more than $1\frac{1}{2}$ miles from the shore. Between Bassa and East points are some hemp plantations worked by the natives.

Anchorage.—The only good anchorage off Samal is in from 9 to 12 fathoms, mud, in the bay, between Pohun point and the mouth of the Binulin river, on the western side of the island, abreast Davao; here shelter can be found from north-east winds. The fishing village of Peña Plata is situated at the head of this bay.

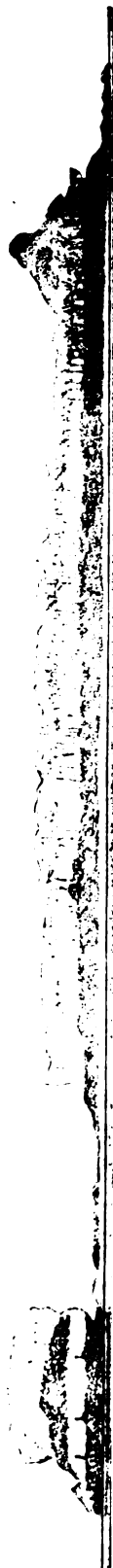
Malipano anchorage, on the west side of Samal, about $7\frac{1}{2}$ miles northward of the southern point, is well protected from wind and sea

General charts 943, 1263.



(a)

Mount Apo, Mindanao.



(b)

Miangas or Palmas Island, from Anchorage on South-east Side.

*S.E. point,
S. 47° W. 2½ cables.*

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

by Malipano islet, and its surrounding rocks and reefs. It is of no commercial importance, and is very small and difficult of access, the entrance having a width of only half a cable between the 3-fathoms lines; there are also a number of sunken reefs in the approach. The depths in the anchorage are from 10 to 20 fathoms, with $5\frac{1}{2}$ fathoms in the entrance.

Directions.—To enter Malipano anchorage, bring the northern part of Malipano islet to bear N. 88° E. and steer for it; when within half a mile of the rocky islet off the north-west point steer for it, and round the north end of Malipano at a distance of about 180 yards, and continue round the eastern point; anchor in 13 fathoms, mud, when the eastern point bears N. 58° W., and the north-west side of Talikud island is just open of the small islet off the south end of Malipano islet.

Talikud island, separated from the south-west part of Samal by a navigable channel three-quarters of a mile wide, is about $4\frac{1}{2}$ miles long north-north-west and south-south-east, about $2\frac{1}{2}$ miles wide, and is reported to lack fresh water and to be uninhabited. It is bordered by a narrow coral reef, which on the north side extends off half a mile. The only detached danger in the vicinity of the island is a shoal of $2\frac{1}{4}$ fathoms least water, lying half a mile W.S.W. from the south point of the island, and one-third of a mile off-shore. The island is heavily wooded and rises near the centre to a height of 475 feet.

Cruz islands.—These islands, two in number, lie off the north-eastern coast of Samal island, with a deep channel between, nearly one mile wide in the narrowest part.

The southern island (*Lat. $7^{\circ} 10' N.$, Long. $125^{\circ} 48' E.$*), the larger of the two, is about one mile long north-north-west and south-south-east, narrow, and 90 feet high. The shore in some places is fringed by a narrow reef. The smaller island lies three-quarters of a mile north-north-westward from the larger; it is $3\frac{1}{2}$ cables long and 42 feet high. From the northern end, reefs, partly dry at low water, extend about a quarter of a mile northward; the eastern side has a narrow fringing reef and the western side is sand beach. In the channel between the two islands there is a small coral patch, dry at low water, and much broken ground. The best water in this channel, $3\frac{1}{2}$ fathoms, is immediately south of this patch. The greater part of the channel is foul, and there seems no necessity for using it.

Shoal.—About one mile northward of the northern Cruz island, is a shoal of sand and rock, with a least depth of 2 fathoms, about a

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

quarter of a mile in extent. Nearly a quarter of a mile northward of this shoal is a small patch with 6 fathoms on it.

Pakiputan strait, between Samal and the main coast, is half a mile wide and 19 fathoms deep in the narrowest part. It should not be taken by a sailing vessel unless the wind is free, and strong enough to enable her to stem the current which runs at times with a velocity of $2\frac{1}{2}$ knots an hour. The flood stream sets to the north, and the ebb to the south. The strait is too narrow for a vessel to work in, and there are several dangers in the approaches.

Dangers.—The only dangers in the southern approach are the 2-fathoms shoal previously mentioned, which lies 2 miles north-eastward of the north entrance point of the Davao river and half a mile off-shore, and a $4\frac{1}{4}$ -fathoms patch, three-quarters of a mile to the north-eastward and half a mile from the western shore.

In the northern approach there is a small detached reef covered by $1\frac{1}{4}$ fathoms lying over a quarter of a mile from the main coast; on the Samal side are Arboles island and its surrounding reefs, and a large reef about $1\frac{1}{2}$ miles southward of Arboles island.

Arboles island (*Lat. 7° 9' N., Long. 125° 41' E.*) is the summit of a coral reef about a mile long north and south, and narrow, with a few mangrove trees on it, which are conspicuous, and furnish a good mark for the southern approach to the strait. The island is covered at high water. The reef surrounding the island is covered with bright coral sand, and shows up well even when covered with 2 or 3 fathoms of water. The narrow channel between Arboles and Samal islands has depths of from 7 to 9 fathoms, but nothing would be gained by using it.

The most dangerous shoal in the northern part of the strait lies about S. 7° W., $1\frac{1}{2}$ miles from the mangroves on Arboles island and nearly half a mile from the Samal shore; several heads on it uncover at very low water.

Clearing marks.—Arboles island in line with Linao point leads eastward of the shoal in the southern approach, and Arboles island in line with Bassa point leads westward of the dangerous shoal southward of Arboles island.

Anchorage.—The best anchorage in the strait, with both northerly and southerly winds is about one mile north-eastward from Linao point, where the water is moderately deep close in to the narrow fringing reef.

Directions.—To enter Pakiputan strait from the southward bring Arboles island almost touching Linao point, and steer for them until

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

within half a mile of the latter; then steer along the Samal shore until Arboles island is in line with Bassa point, when steer on that mark until Linao point bears S. by W. $\frac{1}{4}$ W., and then alter course northward to pass half a mile westward of Arboles island. When Bassa point is abeam, the course may be set as required, the only known off-lying danger northward of the parallel of Bassa point being the shoal previously described northward of the Cruz islands.

Coast.—From Lanang point (*Lat. 7° 7' N., Long. 125° 40' E.*), the coast trends north-eastward, with a curve westward, for 18 miles to the entrance of the Hijo river at the head of Davao gulf. There are no good anchorages and no off-lying dangers off this shore, which may be safely approached to within a mile. The general appearance of the coast is low and flat, with heavy timber and jungle close to the water's edge. The country is a low alluvial plain which stretches northward as far as the eye can reach, forming a broad valley 30 to 40 miles wide. The coast is intersected by several rivers, of no importance to navigation; the Tagum and Hijo are the largest, the others being mere drainage streams.

The Bunauan river, which discharges about 7 miles northward of Lanang point, and the Lasong, which discharges 2 miles farther north-eastward, have formed points at their mouths, the delta of the Lasong being much the larger. These two rivers can be entered and ascended several miles by launches drawing 2 to 3 feet; they have shifting bars at their mouths, and the channels are difficult to find. Midway in the bight between the Bunauan and Lasong rivers is a coral reef three-quarters of a mile long, and narrow, which is awash at the lowest tides; it lies $1\frac{1}{2}$ cables from the shore, with mud inside it.

Tagum river, which discharges about 13 miles north-eastward of Lanang point, is the best known and most important river in the gulf. It has about 6 feet of water on its bar at low water, with deeper water inside, and is reported to be navigable for launches drawing 5 feet for 25 miles. For the first 10 miles it has a uniform width of about 60 yards. The Tuganay river discharges about one cable westward of the Tagum; between the two entrances there is a broad point of land that shifts with the channels. The bars of both rivers drop down suddenly into deep water. The banks of both rivers are from 2 to 4 feet high, generally solid and heavily wooded up-stream. Large quantities of driftwood are constantly being brought down. With a flood tide there is a little current, but with a falling tide it runs with a velocity of from 2 to 4 knots.

A poor anchorage may be found off the bar of the Tagum river in 15 to 20 fathoms, mud. It is reported that the bottom in this vicinity is quicksand, and that vessels have lost their anchors here.

General charts 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 30' E.

There is a fringe of coral over a cable wide at the broad mangrove-covered point 2 miles south-westward of the Tagum river entrance. Between this point and a position one mile southward of the Bunauan river, a distance of about 7 miles south-westward, the shore is fronted by a mud-flat which dries out from one to 3 cables. From the coral-fringed point above mentioned to the mouth of the Tagum river there is a broad sand-beach. From the Bunauan river to the Tagum river the coastline is practically all mangrove, and is overflowed at very high tides except in the broad bight northward of the Lasong river, where for 2 miles the shore line is straight and solid, with banks from 2 to 5 feet high and a narrow fringe of sand beach. The land behind the beach seems drier than elsewhere along this coast.

Danger.—A small shoal that uncovers at very low water lies half a mile north-eastward of the point just referred to, and $3\frac{1}{2}$ cables off-shore; this is practically the only danger in the vicinity.

Coast.—From the Tagum river entrance to Mansaka point, 3 miles north-eastward, the shore for the first mile is mud-flats, dry at low water; the remainder is sandy beach. Mansaka point is low and wooded, and may be easily recognised by an immense dome-shaped tree rising high above the jungle, and visible from a long distance.

From Mansaka point to the Madaum river, 2 miles north-eastward, and thence $1\frac{1}{2}$ miles eastward to the Hijo river, the coast is sand beach, from one to 3 cables wide at low water. The Madaum has 3 feet on the bar at low water and 12 feet inside, but is of no importance, being little more than a slough. On the eastern side of the entrance is a small coral point covered with mangroves.

Hijo river is unimportant; it has very little depth of water on the bar and inside. A small launch can ascend to a distance of about half a mile, but no further. The banks of the river are low, marshy, and covered by mangroves.

CAPE SAN AGUSTIN (*Lat. 6° 16' N., Long. 126° 12' E.*) is the southern extreme of the long peninsula which forms the eastern side of Davao gulf. The entire promontory is mountainous. The northern part is cut into by deep valleys, but the southern part, for 5 miles northward from the extremity of the cape, is a continuous backbone of hills running down the middle of the long narrow strip which terminates in the cape. These hills decrease gradually in height from 1,110 feet 5 miles north of the cape, to a rocky bluff 15 to 20 feet high at its extremity. The Pacific side of the cape for 2 miles is a succession of sandy beaches separated by rocky bluffs. Large vessels can find shelter in Pujada bay; *see* page 641.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

A rock, 18 feet high, fringed by a reef which connects it with the land, lies 20 yards southward from the cape, and is conspicuous when seen from eastward or westward.

Reef.—About a quarter of a mile south-south-westward from Cape San Agustin is the northern end of a reef which extends three-quarters of a mile in a south-south-west direction, with a width of over a quarter of a mile. It has a least depth of $1\frac{1}{2}$ fathoms, and breaks heavily at times. There is a good channel one cable wide between the reef and the cape which may be found by steering on an E.S.E. or opposite course so as to give the 18-foot rock a berth of about $1\frac{1}{2}$ cables. This channel should be used with caution, as the currents are strong and irregular.

EAST SHORE of DAVAO GULF.—From Cape San Agustin the coast trends in a general north-north-west direction for about 70 miles to the Hijo river at the head of the gulf. The chain of mountains extending northward from the cape is interrupted a short distance northward of Arena point by a lower tract of country which extends to the Pacific coast. Near Piso point the high land comes close to the coast, the nearest peak having a height of 2,720 feet. Northward of Piso point the coast is a low, flat, heavily-wooded plain that extends some miles inland to the foothills of a mountain range, but becomes narrower as the head of the gulf is approached.

The rivers are small and unimportant, as are the few villages. Vessels can find anchorage in many places along the coast in fine weather, but nowhere can shelter be obtained from south-west winds.

Coast.—Between Cape San Agustin and Kaganuhan point, 8 miles north-north-westward, the coast recedes eastward for $1\frac{1}{2}$ miles, and the hills come down to the shore line. There are very few sand beaches, and the shore is fringed in places by reefs which extend a quarter of a mile.

Lavigan anchorage, on the north side of Lima point, nearly 2 miles northward of Cape San Agustin, is simply a break in the reef, with depths of one to 4 fathoms, and too small to afford anchorage for anything larger than a small launch. Lima point is fairly conspicuous.

Kanikian point, $3\frac{1}{2}$ miles northward of Cape San Agustin, is low, wooded, and terminates in a cliff about 15 feet high. It is surrounded by a reef $1\frac{1}{2}$ cables wide.

Tagbanao cove (*Lat. 6° 22' N., Long. 126° 10' E.*), about 3 miles north-westward of Kanikian point, is a secluded bight, the point on the south side of the entrance shutting out the view to the southward.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

Anchorage.—Good anchorage may be found in the middle of Tagbanao cove in 18 or 20 fathoms, mud.

Pundaguitan anchorage, about half a mile southward of Tagbanao cove, may be recognised by the kogon grass growing on the steep hillside on the north side of a small valley in which are two or three native houses. A fine sand beach is conspicuous here.

Kaganuhan point (*Lat. 6° 23' N., Long. 126° 9' E.*) is conspicuous when viewed from north and south, mainly on account of six hills that rise in an ascending series from the point; from the southward however only four hills are visible.

The extremity of the point is low and flat, and fringed by a reef and foul ground to a distance of 3 cables. This point should be given a berth of at least half a mile in passing.

Between Kaganuhan point and Kagan point, 4 miles north-north-westward, the coast recedes eastward $1\frac{1}{2}$ miles, forming two bays. The shore line is regular and smooth, with a sandy beach and narrow fringing reef, and may be approached within a quarter of a mile. The small villages of Kulaguhan and Nazaret are situated on this part of the coast.

Anchorage, sheltered from southerly and easterly winds, may be had in Tagabibi bay, north side of Kaganuhan point, in 23 or 24 fathoms, mud, about $1\frac{1}{2}$ cables from the shore, with the extreme of the point bearing S.W. by W.

Batikual point is low, wooded, and surrounded by a reef which dries for a quarter of a mile; Tiblauan village lies about one mile north-westward, at the mouth of a creek.

Nangan bay, southward of Batikual point, is three-quarters of a mile wide between that point and Kagan point, and is about $3\frac{1}{2}$ cables deep. Its shores are low and wooded, and in the northern part bordered by reefs. The depths are from 10 to 50 fathoms.

Anchorage, protected from all winds except those between south and west, may be found in Nangan bay in 22 to 28 fathoms, mud, from $1\frac{1}{2}$ to 2 cables from the shore.

Coast.—From Batikual point the coast trends north-north-westward for $4\frac{1}{2}$ miles to Padada point, which is flat and rounded, but appears as a distinct point from north or south. The village of Luzon is situated about $1\frac{1}{2}$ miles southward, and that of Magdug lies on the beach about one mile northward of Padada point. Lilisan point, a bluff lying $2\frac{1}{2}$ miles northward of Padada point, is about 100 feet high and conspicuous. This section of coast is a sandy beach, fringed in some places by a narrow reef, and is fronted by a number

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

of detached shoals, with depths of from 2 to $3\frac{3}{4}$ fathoms, none of which are more than one mile from the shore.

Mount Bilbogan, situated less than a mile from the shore, about 19 miles northward from Cape San Agustin, and isolated from the high inland peaks, is a conspicuous landmark for the eastern side of Davao gulf, especially when seen from north or south. The peak is pyramidal in form, regular in outline, and 2,450 feet high. From north or south its summit appears serrated, with three small peaks; from the westward it appears as a sharp peak, and when abreast it and a few miles off-shore a sharp thumb is seen protruding at a short distance below the summit. It is rarely covered with clouds.

Borot cove, situated about $1\frac{1}{4}$ miles northward of Lilisan point, is about $3\frac{3}{4}$ cables wide at the entrance, and extends half a mile north-eastward. It is readily identified, the entrance points being rocky bluffs. Both points and the head of the cove are bordered by reefs, leaving an anchorage space about 2 cables in extent in the northern part of the cove. The small village of Monserrat lies at its head.

Borot reef, awash at low water, is a quarter of a mile in extent, and lies about half a mile westward of the north entrance point of Borot cove.

Coast.—From Borot cove the coast trends northward $3\frac{1}{2}$ miles to Bais point, on which is the village of Sigaboy, with a population of 383 in 1908. It is the most important village on the eastern shore of the gulf, and has a large church. Bais point is a low rounded point, with some mangroves on it. The mouth of the Timbo river on the north part of the point is fairly prominent, the beach being higher there. Between the river and the western extreme of the point the timber gives place to kogon grass in places, affording pasturage for a large number of cattle. From Borot cove to Bais point the coast is fronted by a chain of detached reefs lying about half a mile from the shore.

Sigaboy island (*Lat. 6° 37' N., Long. 126° 4' E.*), situated about $2\frac{1}{4}$ miles north-westward of Borot cove and about 4 cables from the shore, is about a quarter of a mile long east and west. It is rocky, with steep cliffs, and has two round, grass-covered hills, the eastern of which is 250 feet high. At the western end is a blunt pinnacle about 150 feet high, and a sandy point extends half a cable from the eastern end. The navigable channel between it and the main is about 2 cables wide, with a depth of $6\frac{1}{2}$ fathoms in the middle. A shoal with a depth of $4\frac{1}{2}$ fathoms extends about $1\frac{1}{2}$ miles north-westward from the island, and reefs extend one mile northward. Sigaboy island only shows up

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

well when seen from northward; from other directions it is projected against a background of hills, and only shows in a favourable light.

Baksal cove, northward of Bais point, is a semicircular cove about $1\frac{1}{2}$ miles wide at the entrance and half a mile deep. At a quarter of a mile from the head of the cove is a rock awash, and there are several detached reefs in the middle, with depths of from $1\frac{1}{2}$ to 2 fathoms. Off the entrance there is a chain of small detached reefs extending about a mile in a north and south direction. The northern entrance point is fringed with a reef with some mangroves on it. The depths in the cove are from 3 to 20 fathoms.

From Baksal cove to Talisay bay, about 2 miles northward, the coast is sandy for the first part and then becomes rocky; a narrow reef fringes the shore in places, and a number of detached shoals lie within one mile of the coast. The small village of La Union, half a mile northward of Baksal cove, lies on the beach at the mouth of a creek.

Talisay bay.—Duas point, the southern entrance point of the bay, is conspicuous, consisting of bare vertical cliffs from 50 to 100 feet high. The bay is about $1\frac{1}{2}$ miles wide at the entrance, and extends half a mile eastward. The land round the bay is low and swampy, and thickly covered with jungle. On the north side of the bay about a third of a mile from the beach is a conspicuous hill, covered with kogon grass and 393 feet high. South-eastward from a half to one mile from Duas point are two other hills, 800 and 910 feet high. The shores of the bay are fringed with reef a quarter of a mile wide, and the anchorage depths are from 8 to 13 fathoms, with $5\frac{1}{2}$ fathoms near the shore.

Burias reef (*Lat. 6° 43' N., Long. 126° 2' E.*), situated nearly 4 miles S. 74° W. from Duas point, the southern entrance point of Talisay bay, is nearly half a mile long in a north-east and opposite direction, within the 10-fathoms limit, narrow, and surrounded by deep water. Near the northern end is a small shifting heap of white coral sand, about 2 feet high; the rest of the reef is nearly dry at low water, and shows a number of scattered coral heads. At about $1\frac{1}{4}$ miles southward of Burias reef is a shoal of $3\frac{3}{4}$ fathoms.

Talisay reef, partly dry at low water, lies 2 miles northward of Burias reef and 3 miles off-shore. It is nearly one mile long north and south, narrow, and is surrounded by deep water except on the north side, where a shoal of $1\frac{3}{4}$ fathoms extends one mile northward. About half a mile southward of Talisay reef is a cluster of rocks surrounded by a reef, which dries at low water, with a shoal of $2\frac{1}{4}$ fathoms southward of it.

Bitaugan point.—The extremity of this point is low, and shows as a bar of shingle, nearly covered at high water,

General charts 943, 1263.

Chart 2575, Eastern part of the Celébes sea. Var. 1° 40' E.

at the mouth of the Bitaugan river, which discharges through the point. Less than half a mile back from the point the land attains an elevation of 400 feet. The Bitaugan river carries a depth of from 3 to 4 feet for about a quarter of a mile, and then changes to a shallow mountain stream, falling over boulders and containing good fresh water.

The coast between Talisay bay and Bitaugan point, $1\frac{1}{2}$ miles apart, is lined with mangroves with sandy beach behind. Midway, there is a narrow strip of kohon grass which extends 3 miles inland, and is noticeable from its smooth, level appearance, the country on either side being very rough.

Reefs.—A rock, awash, lies about $2\frac{1}{2}$ miles, and a shoal of $1\frac{1}{2}$ fathoms about three-quarters of a mile, north-westward from Bitaugan point.

Bato point, about $3\frac{1}{4}$ miles northward of Bitaugan point, is the abrupt end of a ridge about 400 feet high and $1\frac{1}{2}$ miles long in a north-east and opposite direction. The western side of this ridge comes steeply down to the beach. The greater part of the coast between Bitaugan and Bato points is fringed with reef, which in the northern part extends about 3 cables, narrowing towards the south.

Kuabo bay.—From Bato point the coast trends northward and then westward to Sumlug point, forming Kuabo bay, which is about 4 miles wide at the entrance and extends $1\frac{1}{2}$ miles north-eastward, with depths of from 5 to 25 fathoms. The small village of Kuabo is situated at the mouth of the river of the same name, about $2\frac{1}{2}$ miles eastward of Sumlug point; its site is marked by a few cocoanut trees. There are several small detached shoals in the centre of Kuabo bay, covered by very little water.

Sumlug point has a dry sand-bar off the mouth of the Sumlug river, which discharges through the point. A number of native houses on the beach assist in recognising the point.

Reefs.—At about $1\frac{1}{2}$ miles S. 74° W. from Sumlug point there is a small detached reef covered by a least depth of 3 feet; from here a chain of dangerous reefs, some dry at low water and others with very little water on them, extend nearly 4 miles south-south-eastward, the southernmost lying 3 miles westward of Bato point. *See the chart.*

Arena point (*Lat. $6^{\circ} 55' N^{\circ}$, Long. $125^{\circ} 59' E.$*), $4\frac{1}{2}$ miles north-westward of Sumlug point, is low, flat, rounded, and heavily wooded. From both north and south it appears as a sharp point extending far out from the general coastline. It is bordered by a sand beach, and is clean and steep-to, a depth of 10 fathoms being found at $1\frac{1}{4}$ cables from the point. The coast between Sumlug and Arena points is straight,

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 40' E.

low, heavily wooded, and bordered by a sand beach; shoal water extends off nearly 4 cables in places.

Mapanga bay.—Between Arena point and Piso point, $7\frac{1}{2}$ miles northward, the coast curves eastward, forming Mapanga bay, about 2 miles deep. It appears to be deeper than it really is, the effect being due to the mangroves which line the shore for 3 or 4 miles. The Kabatan river, discharging $1\frac{1}{2}$ miles northward of Arena point, is small and only 2 or 3 feet deep; the Mapanga river, about $2\frac{1}{4}$ miles northward of Kabatan river, is a salt slough with a fine sandy bottom, and can be entered by a ship's launch at high water. The mouth of the Piso river, which discharges nearly midway between Arena and Piso points, is nearly closed by a bar, and can only be entered by pulling boats; the entrance can be recognised by a small reef near it which dries at low water. There are anchorage depths in Mapanga bay of from 8 to 20 fathoms.

Mount Galintan, situated about $5\frac{1}{2}$ miles S. 67° E. from the mouth of the Piso river, is a symmetrical cone-shaped peak, 1,710 feet high; being nearly always free from clouds, it forms a conspicuous landmark.

Mapanga reef, about 2 miles south-south-east of Piso point, is partly dry at low water, and is half a mile in extent within the 5-fathoms limit. At half a mile south-west of the drying part is a patch of $2\frac{3}{4}$ fathoms.

Piso reef, small and dry at low water, lies $1\frac{1}{2}$ miles southward of Mapanga reef, and about the same distance westward of the Piso river entrance.

Between Mapanga and Piso reefs and the shore are several small reefs, for the positions of which, *see* the chart.

Clearing mark.—Piso point, bearing North, leads westward of the above dangers.

Piso point (*Lat. $7^{\circ} 3' N.$, Long. $125^{\circ} 57' E.$*) stands out boldly, the hill forming the point rising to a height of 775 feet at a distance of about $3\frac{1}{2}$ cables inland. Part of the shore of the point is rocky, with a narrow fringing reef; the remainder is mangroves with mud exposed to a distance of 60 yards at low water. From about three-quarters of a mile to 3 miles north-westward of the point are several shoals and reefs at a distance of three-quarters to half a mile from the shore. North of Piso point there is a small sheltered harbour with depths of from 5 to 10 fathoms.

Pangasinan point, about 6 miles north-westward of Piso point, is low, wooded, and surrounded with a coral and sand beach. At

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

about one mile south-westward and north-westward of Pangasinan point are two shoals with $4\frac{1}{2}$ and 5 fathoms on them respectively.

Coast.—From Pangasinan point the coast trends northward $8\frac{1}{2}$ miles to Gill point; as far as Mugnuga bay, which has depths of from 5 to 12 fathoms, there is sand beach, then coral beach to 3 miles south of Gill point, followed by mangroves for 2 miles. The beach around Gill point is of coral and gravel, and very narrow. The country behind this coast is covered with dense jungle. At $2\frac{3}{4}$ miles south-south-eastward of Gill point a reef is shown as extending off nearly half a mile, with a rock awash on it.

Copia island (*Lat. $7^{\circ} 16' N.$, Long. $125^{\circ} 50' E.$*), about $1\frac{1}{4}$ miles northward of Gill point, is about one mile long north and south, $3\frac{1}{2}$ cables wide, and is well wooded on the western side. It lies about 3 cables from the mainland. Nearly half a mile S. by E. from the south end of the island and 4 cables from the shore is a small round shoal, on which the least depth is $3\frac{3}{4}$ fathoms

Anchorage.—There is good anchorage for all classes of vessels, with shelter from winds between north-north-west through north to east-south-east southward of Copia island, with sufficient swinging room to clear the $3\frac{3}{4}$ -fathoms shoal previously mentioned.

Good anchorage for small vessels may be found in-shore of Copia island by rounding the island at a distance of about $1\frac{1}{2}$ cables, and anchoring in mid-channel in from 6 to 9 fathoms abreast the middle of the island. A stranger should not attempt the channel between Copia and Pandasan, as it is foul.

Pandasan island, about 2 miles northward of Gill point, and north-eastward of Copia island, is less than a quarter of a mile in extent, and difficult to distinguish from the land at a distance. It lies near the shore, the channel between being half a cable wide, with depths of from 3 to 5 fathoms; it is blocked at the northern end, and forms an excellent harbour of refuge for small craft. The southern entrance has depths of 10 and 12 feet, over mud.

A fair anchorage, sheltered from winds between north-east and south-east, in from 12 to 15 fathoms, mud, may be found half a mile northward of Pandasan island and one-third of a mile off-shore.

Coast.—From Pandasan island to the Hijo river the shore-line is nearly all mangroves, with here and there a little solid beach. With the exception of about a mile of muddy shore in the extreme corner of the gulf, there is a fringe of coral from a half to $1\frac{1}{2}$ cables wide.

The country around the head of the gulf is very thinly populated, and only five settlements of about a dozen houses each are found.

General charts 943, 1263.

Chart 2575, Eastern part of the Célèbes sea. Var. 1° 30' E.

They are Mugnuga on Mugnuga bay, Copia on Copia island, Mam-pissin and Tugnanang on the mainland opposite, and Madaun near the river of that name. The site of the village of Hijo has only three or four huts.

CURRENT.—Off Cape San Agustin there appears to be a strong constant current to the south-west. In December, 1861, H.M.S. *Sphinx* was set S. 44° W. 42 miles in 16 hours; in February, 1875, H.M.S. *Challenger*, after passing to the eastward of the Sarangani islands, experienced a set S. 16° W. 38 miles in 24 hours; and in May, 1882, H.M.S. *Lily* experienced a set S. 55° W. 65 miles in 24 hours.

Miangas or Palmas island (*Lat. 5° 35' N., Long. 126° 36' E.*), lying about 75 miles east of Tinaka point, the south end of Mindanao, is about 300 feet high, and one mile in extent east and west.

Plan of South-east anchorage on chart 2575.

Anchorage may be had in a small open bay at the south-east part of the island, in a depth of 19 fathoms, with a flagstaff near the shore in the bight of the bay, bearing N.W., distant $2\frac{1}{4}$ cables; the shore reef extends off to the distance of about half a cable. The tidal streams are very strong. View *b*, at page 700.

General charts 2575, 943, 1263.

PLACE—SANDAKAN. Obs. Δ. LAT. 5° 49' N. LONG. 118° 12' E. HEIGHT ABOVE M.S.L. 10 FEET.
METEOROLOGICAL TABLE COMPILED FROM 5 TO 19 YEARS' OBSERVATIONS.

METEOROLOGICAL TABLE ; SANDAKAN.

713

MONTH.	BAROMETER. At 35° F. and Mean Sea Level.				AIR TEMPERATURE.						Relative Humidity. Cloud Amount. Scale 0 to 10.		RAIN.				WIND.								No. of Days Gale.	No. of Days Fog.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	Mean.		Absolute.		Mean.		Absolute.		Range.	For Month.	Max.	Min.	°	°	°	°	°	°	°	°	°	°	°	°			°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°

Authorities :—" British North Borneo Herald."
" Journal of the Meteorological Society."

Meteorological Office,
19th March, 1910.

PLACE—ILOILO. OBS. Δ LAT. 10° 41' N. LONG. 122° 34' E. HEIGHT ABOVE M.S.L. 20 FEET.
METEOROLOGICAL TABLE COMPILED FROM 2 TO 5 YEARS' OBSERVATIONS.

MONTH.	BAROMETER At 32° F. and Mean Sea Level.				AIR TEMPERATURE.						Relative Humidity.		RAIN.			WIND.								No. of Days Gale.	No. of Days Fog.												
	Mean.		Absolute.		Mean.		Absolute.		For Month.	Range.		Max.	Min.	Range.	Ins.	No. of Days.	Max. Fall in 24 hours.	Mean Force Beaufort Scale.	Number of Days from																		
	Ins.	Therm.	Ins.	Therm.	Ins.	Therm.	Ins.	Therm.		Max.	Min.								N.	N.E.	E.	S.E.	S.			S.W.	W.	N.W.	Calm.								
January.	29-89	—	30-08	29-64	0-44	78	86	72	14	96	68	28	85	6	3-31	12	2-02	2	—	28	—	0	—	0	—	0	3	—									
February	29-97	—	30-17	29-73	0-44	77	85	72	13	89	66	23	83	6	1-07	9	0-97	1	—	28	—	0	—	0	—	0	0	—									
March	29-89	—	30-08	29-76	0-32	79	88	72	16	97	67	30	79	4	0-99	2	0-68	2	—	27	—	1	—	1	—	2	0	—									
April	29-86	—	30-02	29-69	0-33	81	90	74	16	96	71	25	78	5	3-12	6	1-98	1	—	24	—	1	—	3	—	2	0	—									
May	29-85	—	30-05	29-68	0-37	82	91	75	16	100	72	28	81	6	5-56	10	2-80	1	—	12	—	1	—	14	—	3	1	—									
June	29-83	—	29-92	29-63	0-29	81	88	75	13	99	64	35	84	7	10-70	15	5-16	1	—	7	—	1	—	22	—	0	0	—									
July	29-80	—	29-93	29-44	0-49	80	87	74	13	95	68	27	88	8	30-00	20	6-28	1	—	4	—	0	—	27	—	0	0	—									
August	29-82	—	29-95	29-69	0-26	80	87	74	13	92	68	24	88	7	17-58	21	2-75	1	—	4	—	0	—	27	—	0	0	—									
September	29-84	—	30-03	29-73	0-30	80	87	74	13	92	68	24	88	7	12-33	20	1-98	1	—	3	—	0	—	26	—	0	1	—									
October	29-85	—	29-99	29-65	0-34	79	87	74	13	92	69	23	86	7	10-46	18	3-70	1	—	13	—	0	—	13	—	4	1	—									
November	29-87	—	30-01	29-68	0-33	79	87	73	14	91	69	22	85	7	6-49	15	6-52	1	—	22	—	0	—	7	—	0	1	—									
December	29-88	—	30-12	29-68	0-44	78	86	73	13	90	65	25	86	6	8-95	16	3-10	2	—	23	—	0	—	2	—	4	2	—									
Means	29-86	—	—	—	—	80	87	73	14	—	—	—	84	6	—	—	—	1	—	—	—	—	—	—	—	—	—	—									
Totals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	164	—	—	—	195	—	4	—	142	—	15	9	—									
Absolute Val.	—	—	30-17	29-44	0-73	—	—	—	—	100	64	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									
No. of Yrs' Obs.	3	—	3	—	—	4	2	—	—	3	—	—	—	—	2	3	2	3	—	—	—	—	—	—	—	—	—	5									

* Correction for Gravity -0.07 in. Not applied.

Authorities:—"Reports of Philippine Weather Bureau."

"Challenger" Report.

W. N. SHAW,
Meteorological Office,
19th March, 1910.

APPENDIX I.

TIDES IN THE PHILIPPINE ISLANDS.

The following Remarks are taken from the Spanish "Derrotero del Archipielago Filipino 1879."

During the progress of the Spanish survey of the Philippines, tidal observations were made at Corregidor, Iloilo, and Balábac ; these show the influence of the diurnal wave to be as great or greater than that of the semi-diurnal wave. From these observations tables for finding the time and height of high water were constructed, in which the following laws are discernible.

Two days after the moon passes the equator two flood and two ebb tides are observed during the twenty-four hours, of approximately equal value ; during the next seven or eight days one of the flood tides increases and the other decreases, until there is only one perceptible in the twenty-four hours, which single tide attains its greatest value two days after the moon has reached her greatest declination either North or South.

This single tide then decreases in range as the moon's declination decreases, and soon a second tide becomes apparent, increasing daily in range and becoming equal to the first tide two days after the moon has again crossed the equator, and so forth with successive semi-lunation.

There is no regular establishment, as the luni-tidal interval varies with the days elapsed since the moon's declination was *nil*, from two and a half hours before the moon's transit to two and a half hours after. The amount of interval is given in Table I.

The range of spring tides varies with the seasons, being at a maximum about the solstices, and at a minimum about the equinoxes.

The age of spring tides varies with the seasons ; at the solstices the highest tide occurs on the day of new and full moon, and at the equinoxes it occurs at the moon's quarters.

TABLE FOR FINDING THE TIME AND HEIGHT OF HIGH-WATER IN MANILA BAY, AT BALÁBAC AND ILOILO.

Table I. contains the establishment of Port Corregidor, at the entrance of Manila bay, according to the number of days elapsed since the moon's declination was *nil*.

From this table the time of high water can be found by the usual method, adding or subtracting the establishment of the port according to the sign in the table.

TABLE I.—ESTABLISHMENT OF THE PORT AT CORREGIDOR ISLAND.*

Days elapsed since the Moon's declination was <i>nil</i> .														
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Moon's declination North.														
$\begin{smallmatrix} + \\ h\ m \\ 10\ 10 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 26 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 1\ 20 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 1\ 34 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 1\ 50 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 7 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 24 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 36 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 41 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 46 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 46 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 40 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 30 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 22 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 17 \end{smallmatrix}$
Moon's declination South.														
$\begin{smallmatrix} - \\ h\ m \\ 2\ 12 \end{smallmatrix}$	$\begin{smallmatrix} - \\ h\ m \\ 2\ 0 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 11\ 15 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 55 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 35 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 22 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 10 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 57 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 48 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 43 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 37 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 43 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 48 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 9\ 58 \end{smallmatrix}$	$\begin{smallmatrix} + \\ h\ m \\ 10\ 4 \end{smallmatrix}$

For example (i.) :—To find the time of high water at Corregidor on the 1st of February, 1890 ; the moon's declination was *nil* on the 25th January, therefore the number of days since elapsed is six, and the establishment of the port for the day according to Table I. is — 2h. 24m. ; then :—

	Lower. h. m.	Upper. h. m.
Moon's mer. pass. at Greenwich on 1st Feb.	9 27 a.m.	9 51 p.m.
Correction for longitude 120° E. -	0 16 -	0 16 -
Correction for semi-diameter 14' 45" -	0 30 +	0 32 +
Establishment of port, Table I. -	2 24 -	2 24 -
Time of high water at Corregidor -	7 17 a.m.	7 43 p.m.

* The table in the "Derrotero" gives the establishment for each month ; in this work the yearly mean only is given.

Table II. contains Tidal Differences for Balábac, and Iloilo, which being applied according to the sign + or - to the hour of high water at the Standard Port Corregidor, will give the hour of high water at those places.

TABLE II.—TIDAL DIFFERENCES FOR BALÁBAC AND ILOILO WITH REFERENCE TO STANDARD PORT CORREGIDOR.

Days elapsed since Moon's declination was nil.															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Moon's declination North.															
Balábac	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Iloilo -	+27 +80	+23 +52	+19 +40	+16 +33	+15 +25	+16 +22	+18 +20	+20 +24	+23 +28	+25 +38	+27 +50	+29 +74	+31 +110	+32 +106	+32 +98
Moon's declination South.															
Balábac	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Iloilo -	+32 +90	+32 +76	+30 +66	+26 +56	+20 +48	+13 +41	+9 +33	+8 +24	+10 +20	+12 +25	+14 +36	+17 +52	+20 +68	+24 +84	+27 +82

For example (ii.) :—If the time of high water at Corregidor is 7h. 17m. on the sixth day after the moon's declination was nil, the correction to be applied for Iloilo from Table II. is + 20m., and the time of high water at Iloilo will be 7h. 37m.

Table III. gives the height of the highest tide daily above the mean level of the sea at Corregidor ; this height should be corrected from Table IV. for the apparent semi-diameter of the moon.

For Balábac and Iloilo the height of high water may be found *approximately* by multiplying the height at Corregidor by 1.3 for Balábac, and 1.6 for Iloilo.

TABLE III.—HEIGHT OF HIGHEST TIDE DAILY ABOVE THE MEAN
LEVEL OF THE SEA AT CORREGIDOR.

Month.	Days elapsed since Moon's declination was <i>nil</i> .														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
January - - -	10	09	06	09	10	13	16	19	20	20	20	19	16	16	13
February - - -	13	10	09	06	08	09	10	13	16	16	19	16	16	13	13
March - - -	10	09	06	09	10	13	13	14	16	16	16	14	13	10	09
April - - -	06	06	09	13	16	19	20	20	20	19	16	14	13	10	09
May - - -	09	06	10	13	16	19	20	23	23	23	20	19	16	13	10
June - - -	10	09	09	13	16	20	23	26	29	29	26	23	20	20	19
July - - -	19	13	10	10	13	19	20	23	26	29	29	26	23	23	20
August - - -	20	16	13	10	13	16	19	20	23	26	26	29	26	23	20
September - -	19	16	13	13	16	19	20	20	23	23	23	20	20	20	19
October - - -	13	13	16	19	20	20	20	20	20	20	20	19	16	16	13
November - - -	10	09	13	16	19	20	23	23	23	23	20	19	16	13	10
December - - -	09	09	10	13	16	19	20	23	23	23	20	20	19	13	10

TABLE IV.—CORRECTION TO THE HEIGHT OF HIGH WATER FOR
THE SEMI-DIAMETER OF THE MOON.

Moon's Semi- diameter.	Correc- tion.	Moon's Semi- diameter.	Correc- tion.	Moon's Semi- diameter.	Correc- tion.	Moon's Semi- diameter.	Correc- tion.
14 44	- 5 in.	15 20	- 2 in.	15 56	+ 1 in.	16 32	+ 4 in.
14 56	- 4 „	15 32	- 1 „	16 8	+ 2 „	16 44	+ 5 „
15 8	- 3 „	15 44	0 „	16 20	+ 3 „		

For example (iii.) :—To find the height of the highest high water above the mean level of the sea at Corregidor on the 1st of February, 1890, six days having elapsed since the moon's declination was *nil*, and the moon's semi-diameter being 14' 44". The height of high water in Table III. is one foot, and the correction in Table IV. for semi-diameter is - 5 inches, therefore the rise of the highest tide on that day is 0 ft. 7 in. As the higher water of each day follows the moon's lower transit when she has North declination, the a.m. tide will be the highest. See example (i.) and last paragraph on preceding page.

TABLES FOR FINDING THE HOUR OF HIGH AND LOW WATER,
AND THE HEIGHT ABOVE THE MEAN LEVEL OF THE SEA
ON THE SOUTH COAST OF MINDANAO DURING THE PERIOD
FROM SPRINGS TO NEAPS.

Table I. contains the correction to "mean establishment" for Samboanga, Isabela, Palak, and Davao, which should be applied according to the sign + or -. The table is constructed for the mean parallax 57'; for every 1' of parallax less or greater than 57' the correction should be increased or diminished by $\frac{1}{4}$ of its value.

The "mean establishment" for Samboanga is 7h. 8m.; for Isabela 8h. 9m.; for Palak 6h. 35m.; and for Davao 6h. 23m.

TABLE I.—CORRECTION TO "MEAN ESTABLISHMENT."

Hour of Moon's transit	h 0	h 1	h 2	h 3	h 4	h 5	h 6	h 7	h 8	h 9	h 10	h 11
Correction, in minutes	+23	+6	-25	-47	-67	-78	-42	+18	+58	+70	+58	+37

For example (i).—To find the time of high water at Samboanga on the 1st February, 1890.

	Upper. h. m.	Lower. h. m.
Moon's mer. pass. at Greenwich 31st Jan.	9 2 p.m., 1st Feb.	9 27 a.m.
Correction for long. 122° E.	- 17—	17—
Moon's mer. pass. at Samboanga	8 45 p.m.	9 10 a.m.
"Mean establishment," 7h. 8m.; correction from Table I., + 1h. 6m.; corrected establishment, 8h. 14m.; then :—		
Moon's mer. pass. at Samboanga 31st Jan.	8 45 p.m., 1st Feb.	9 10 a.m.
Corrected establishment	8 14	8 14
Time of high water, 1st Feb.	4 59 a.m.	5 24 p.m.

Table II. contains the amount of reduction, according to the hour of moon's transit, to be subtracted from half mean spring range in order to obtain the height of semi-diurnal high water for the period intermediate between springs and neaps.

The half mean spring range for Samboanga is about $2\frac{1}{2}$ feet; for Isabela about $1\frac{1}{2}$ feet; for Palak 3 feet; and for Davao $2\frac{3}{4}$ feet.

TABLE II.—REDUCTION TO THE HEIGHTS OF SPRING TIDES.

Hour of Moon's transit	h 0	h 1	h 2	h 3	h 4	h 5	h 6	h 7	h 8	h 9	h 10	h 11
Samboanga - - -	in. 2	in. 0	in. 0	in. 2	in. 4	in. 8	in. 12	in. 12	in. 10	in. 9	in. 6	in. 3
Isabela - - -	1	0	0	1	2	4	6	6	6	5	3	2
Palak - - -	2	0	0	4	9	16	22	25	23	18	10	5
Davao - - -	2	0	0	3	8	14	20	22	20	16	10	5

Table III. contains a correction to the height of semi-diurnal high tides for diurnal inequality, and should be applied as follows:—for moon's declination North add to the tide following the moon's lower transit, and subtract from the tide following the upper transit; for moon's declination South, add to the tide following the moon's upper transit, and subtract from the tide following the lower transit.

The correction for parallax is inconsiderable, amounting to less than an inch as maximum.

TABLE III.—CORRECTION TO THE HEIGHT OF SEMI-DIURNAL HIGH WATER FOR DIURNAL INEQUALITY.

Moon's declination.		0°	5°	10°	15°	20°	25°	28½°
Samboanga	December, January, June, July -	in. 0	in. 4	in. 7	in. 11	in. 14	in. 17	in. 20
	February, May, August, November -	0	3	5	9	12	15	17
	March, April, September, October -	0	2	5	8	10	12	14
Isabela	December, January, June, July -	0	5	10	15	20	23	27
	February, May, August, November -	0	4	7	12	17	20	24
	March, April, September, October -	0	3	6	11	14	17	20
Palak	December, January, June, July -	0	3	5	8	10	12	14
	February, May, August, November -	0	2	4	6	9	11	12
	March, April, September, October -	0	2	3	5	7	9	10
Davao	December, January, June, July -	0	2	4	6	9	10	11
	February, May, August, November -	0	2	3	5	7	9	10
	March, April, September, October -	0	2	3	4	6	7	8

For example (ii.):—To find the height of high water above the mean level of the sea at Samboanga on the 1st February, 1890; the reduction from Table II. for moon's mer. pass. 7h. is — 12 inches, and the correction

from Table III. for moon's declination 23° N., is + 14 inches for the tide following the moon's lower transit, and - 14 inches for the tide following the moon's upper transit; then:—

			Lower, ft. in.	Upper, ft. in.
Half mean spring range, Samboanga	-	-	2 6	2 6
Reduction from Table II., mer. pass. 7h.	-	-	1 0—	1 0—
Correction from Table III. decl. 23° N.	-	-	1 2+	1 2—
Height of high water following moon's transit	-	-	2 8	0 4

Table IV. contains a correction to the time of semi-diurnal low water for diurnal inequality. In applying this correction it should be remembered that the low tide which precedes the highest tide of the day is in advance, while that which follows it is delayed. The sign (*) in the table indicates that for the corresponding declination of the moon there is but one tide in the day.

TABLE IV.—CORRECTION TO THE TIME OF SEMI-DIURNAL LOW WATER FOR DIURNAL INEQUALITY IN MINUTES.

Moon's declination.		0°	5°	10°	15°	20°	25°	28½°
		m	m	m	m	m	m	m
Samboanga	(Full and change	0	10	15	20	24	26	30
	Three days after full and change	0	11	18	25	30	41	48
	Quarters	0	32	48	•	•	•	•
Palak and Davao—Mean Correction		0	4	7	10	13	16	18

For example (iii.):—To find the time of low water at Samboanga on the 1st February, 1890. The highest high water of that day being at 5h. 24m. p.m. (see example i.), then:—

		h.	m.	h.	m.
Approximate times of low water	-	11	11 a.m.	11	36 p.m.
Correction from Table IV.	-	-	10 advance	10 retard	
Times of low water	-	11	1 a.m.	11	46 p.m.

The correction to the height of semi-diurnal low water for diurnal inequality is inconsiderable.

APPENDIX II.

PARTICULARS OF DRY DOCKS, PATENT SLIPS, &c.

PORT.	Name of Dock.	Length.		Breadth of Entrance.	Depth at H.W.O.S.		Lifting Power.	Date Built.	Remarks.
		On Blocks.	Over All.		On Sill.	On Blocks.			
Sandakan	Patent Slip	Feet 145	Feet —	Feet —	Feet Forward	Feet 4½	Tons 400	—	Depth on cradle at H.W.O.S. from 10 to 10½ feet. Can accommodate small vessels of 130 feet in length, and 8 feet draught. On Maktan island.
Samboanga	Dry Dock	(cradle) 130	—	—	Aft —	9½	—	—	
Iloilo	Patent Slip	119	—	—	Forward	6	300	—	
Port Sebu	"	(cradle) —	—	—	Aft	11	300	—	
Palak (Pollok)	Dry Dock	—	—	—	Forward	4	—	—	
					Aft	11	—	—	
					6 to 7	—	—	—	

APPENDIX III.

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS OF DEPTHS, &C.

PORT.	Depth at L.W.O.S. in channel of approach.	Depth at L.W.O.S. in anchorage.	Rise of Tide.	Remarks.
Agusan river entrance.	8 feet	20 to 27 feet ..	Feet. 3 to 4	
Aparri	Open roadstead	4 to 10 faths. ..	3½	
Balayan	Open roadstead	7 to 20 faths. ..	4½	
Batan, Panay ..	4 faths.	5 to 6 faths ..	5½	
Bikol river, off, San Miguel Bay.	14 to 17 faths.	3 to 4 faths. ..	—	
Borongan	Deep	5 to 6 faths. ..	4½	
Galera	6½ faths.	10 to 13 faths. ..	5	
Gubat	Deep	5 to 6 faths. ..	4½	Northern bight.
Guiuan	12 faths.	4 faths.	2½ 6½	
Igat bay	Deep	11 faths.	(springs) 5 (neaps)	
Iloilo	N.E. approach 3½ & 3½ faths.	15 faths.	4½ (springs) 3 (neaps)	In 1910, depth in river channel 15 feet; outside river entrance 13 feet.
Iloilo	S.W. approach, 6½ faths.	15 faths.	4½ (springs) 3 (neaps)	
Kudat	7 to 10 faths. ..	6 to 7 faths.	5½ to 6½ (springs) 4½ (neaps)	
Lahat Datu	10 to 20 faths.	5 faths.	—	
Laoang harbour	1½ faths.	2½ faths.	6	Depths as charted. It is said that vessels of 14 or 15 feet draught can enter at high water.
Legaspi	Open roadstead	17 to 22 faths.	7½	
Libas	17 faths.	2 to 12 faths. ..	3 to 7½	
Mati, Pujada bay	Deep	10 to 20 faths.	6	
Matnog bay	Deep	3 to 8 faths. ..	1½	
Mercedes	Open roadstead	7 to 8 faths. ..	—	
Misamis	5½ to 7 faths. ..	4 to 10 faths. ..	4½	
Nin bay	Deep	4 to 7 faths.	9 6	
Palak harbour ..	Deep	17 to 18 faths.	(springs) 4½ (neaps)	Off Palak.
Palak harbour ..	Deep	12 to 14 faths.	(springs) 4½ (neaps)	Off Parang.
Palanog	27 to 32 faths.	16 to 17 faths.	6	
Palapag	12 to 24 faths.	5 to 9 faths. ..	6	
Palompon	25 faths.	7 to 10 faths.	—	
Romblon	Deep	14 to 18 faths.	4½	
Samboanga	Open roadstead	10 faths.	4½	

PORT.	Depth at L.W.O.S. in channel of approach.	Depth at L.W.O.S. in anchorage.	Rise of Tide.	Remarks.
Sandakan	4 faths.....	8 faths.....	Feet. 8 (springs)	Anchor according to draught.
Sebu	N.E. approach, 5 to 11 faths.	6 to 10 faths..	3½ (neaps)	
Sebu	S. approach, 5½ to 8 faths.	6 to 10 faths..	5	
Sibetik Island coal depôt.	7 to 13 faths.	8 faths.	12½ (springs)	
Silam	Deep	9 to 16 faths.	7 (neaps)	
Sorsogon	9 to 24 faths..	2½ to 7 faths..	7½ (springs)	
Sulu	Open roadstead	12 to 14 faths.	4 (neaps)	
Taal and Lemery	Open roadstead	10 to 20 faths.	—	
Tabako bay	10 to 15 faths.	25 to 30 faths.	—	
Tabgon anchorage	11 faths.	4 to 16 faths..	7½	
Takloban	N. approach, 2 faths.	2½ to 3 faths.	2½	
Takloban	S.E. approach, 3½ faths.	2½ to 3 faths.	2½	

INDEX.

	Page		Page
Abai clump - - -	- 174	Aguja peak - - -	- 174
Abak, town - - -	- 506	—— point - - -	- 480
Abalug mountains, river -	- 528	Agus river - - -	- 440
Abatan river - - -	- 405	Agusan river - - -	- 432
Abel reef - - -	- 404	——, anchorage,	
Abnormal variation - - -	- 346	direction - - -	433
Abongabon river, town -	- 313	——, bar, landmark -	432
Aborlan, town - - -	- 103	——, leading beacons,	
Abriop bank - - -	- 574	lights - - -	432
Abuyog, telegraph station,		——, pilots - - -	432
town - - -	635	——, tides - - -	433
Acantilada point - - -	- 93	Agutaya island, anchorage -	66
Acha rock, Dumankilas bay -	- 667	Agutayan island, point -	583
—— shoal, Ragay gulf -	- 475	Ahui bay, river, town -	364
Ada reef - - -	- 118	Ahus island, tanjong -	236
Adal island - - -	- 203	——, off-lying dangers -	237, 238
Adam reef - - -	- 404	—— point - - -	461
Adams reef, clearing mark -	- 196	——, reef south-west of -	462
Addison peak - - -	- 107	Airy, mount - - -	97
—— point - - -	- 96	Akdan hill or mount - -	328
Adolphy point - - -	- 230, 233	Aklan point - - -	351
Adyagan island - - -	- 490	——, anchorage south-	
Afuera bank, clearing mark -	- 34	west of - - -	351
Agajo town, anchorage off -	- 435	—— river - - -	351
Agas point - - -	- 231, 233	Alabat island - - -	546
Agbau bay, anchorage -	- 586	—— port - - -	546
Agbatan point - - -	- 337	——, anchorage, tides -	547
——, beacon, light -	- 338	——, water - - -	547
Agdan point - - -	- 622	—— town - - -	547
Agio islet - - -	- 361	Alad island - - -	337
—— point - - -	- 407	Alava island - - -	52
Agnas point - - -	- 486	Albay gulf - - -	594
Agojo point - - -	- 578	——, head of, landmarks -	598
Agonoy islet - - -	- 638	——, northern side - -	594
Agos river, anchorage off -	- 539	——, southern side - -	599
Agpitan islet - - -	- 470	——, telegraph station, town -	598
Agria point - - -	- 538	—— volcano - - -	598
Aguada island - - -	- 505	Alegria town - - -	386
—— peak - - -	- 67	Alert patches and banks,	
—— point - - -	- 522	caution - - -	224
Aguasa bay, anchorage -	- 464	Alerta island - - -	60
Aguda rock - - -	- 565	Alibatan islet - - -	316
Agudo, mount - - -	- 355	Alibihaban island - -	474
Aguirre bank, Kalamianes -	- 59	Alice channel - - -	185
——, Sulu - - -	- 263	——, bank - - -	185
—— port of - - -	- 521	——, tidal streams -	185

	Page		Page
Alice reef - - - -	185	Anahau island - - - -	616
Aligbay island - - - -	448	Anahauan island, rocks off -	427
——, banks south-east of	448	—— point - - - -	311, 312
Alijara island - - - -	60	Anajauan island, Negros - -	374
Alikan point, shoals off -	271	Anauayan channel - - - -	368
Alimagro town - - - -	497	—— island - - - -	363
Alimpaya point - - - -	454	Anchor island - - - -	566
Alisud point - - - -	640	Anchorage island, dangers -	97
Alkoi town - - - -	401	Andis island - - - -	618
Allard bank - - - -	170	Andrassy, mount - - - -	212, 213
Allen, town, anchorage off -	509	Andulinang islet - - - -	183
Almirante Gil hill - - - -	119	Angas point - - - -	457
Alo point - - - -	643	Angosto rock - - - -	244
Aloquinsan town - - - -	385	Anibun point - - - -	632
Aloh village - - - -	293	Anima Sola islet - - - -	479
Alonon point - - - -	50	Animosa rocks - - - -	55
Aloran village, anchorage for -	445	Anini town, anchorage off -	326
Alpako, coal mine - - - -	400	Anipahan peaks - - - -	99
Alpha shoal - - - -	59	Anitaguipan point - - - -	618
Altnacraig shoal - - - -	104	Anson shoal - - - -	533
Alto point, reef - - - -	589	Antagtakan point - - - -	470
—— de Flecha, mountain -	668	Antipolo - - - -	4
——, anchor-		Antiki province - - - -	322
age west of	669	Antoinette, mount - - - -	229
Alubihit anchorage - - - -	438	Antonia islet - - - -	358
Alutaya shoal - - - -	437	Anuling islet - - - -	71
Amagadpagat islet - - - -	426	Aokon island - - - -	525
Amalia islet - - - -	553	Aparri, light - - - -	528
Ambil bank - - - -	35	—— telegraph, town - - - -	528
—— island, anchorage - - -	34	—— tides and tidal streams -	529
——, and Lubang, tidal		—— to Port San Vicente,	
streams between	34	coast	529
Ambilon shoal - - - -	282	Apas river - - - -	226
Amblan point, town - - - -	380	Apat bay, anchorage - - - -	548
Ambolon island - - - -	43	—— island - - - -	548
——, dangers off - - - -	43	Apga point - - - -	351
——, light - - - -	43	Apit island - - - -	415
Ambos Camarines, province -	559	Apiton cove, water - - - -	363
Amigos, Dos, port - - - -	291	—— island, anchorage - - -	612
Amogotada point, Andis island -	618	——, off-lying islands	612
——, Leite, W. coast	414	——, channel within	612
—— to Green point,		Apiton pass - - - -	362
coast	415	Apo east pass - - - -	46
Amoron point - - - -	492	——, directions - - - -	46, 47
Anaganahao islet - - - -	310	—— island, Mindoro strait, light	45
—— and Silonay,		——, Negros, light - - - -	375
channel between	310	—— and Negros, current	
Anahao island - - - -	623	between - - - -	375
—— point - - - -	582	Apo, mount - - - -	430, 697
—— to Dalaynay point,		—— reef - - - -	45
coast	583	——, west pass - - - -	47
—— port - - - -	582	Appo island - - - -	114
——, directions - - - -	583	Apud shoal - - - -	476
——, entrance - - - -	582		

	Page		Page
Apulit island - - -	85	Ayoni bay, anchorage - -	463
Araceli bay, anchorage - 88,	89	----- to Sabunguin point,	coast 463
----- town - - -	88		
Arana rock - - -	343		
Arangasa island - - -	638		
Arayat shoal, shoals east of -	660		
Arboles island - - -	702	Ba hé li peak - - -	96
----- point - - -	379	Babaguan bay - - -	582
Arch rock - - -	581	----- cove, village - -	582
Arena islet - - -	478	-----, rocks off - -	583
----- point, Davao gulf - -	709	Babatgun anchorage - -	504
-----, Ragay gulf - -	465	Babayon point - - -	595
-----, tidal streams - -	473	----- reef - - -	595
Arenas point, Luzon, south coast	303	Babi, pulo, reefs off - -	196
-----, Sorsogon, light - -	484	Baculud point - - -	594
Arenosa point - - -	351	Badian bay - - -	386
Areta shoal - - -	59	----- island, anchorage -	386
Arévalo bay - - -	498	----- point - - -	476
Argao point, town - - -	400	----- town - - -	386
----- to Dalaguete point,		Badlay island - - -	495
coast	401	Badungbadung islet - -	631
-----, telegraph station, cable -	400	Baeto point - - -	304
Argos bank - - -	345	Bagababay island - - -	488
----- point - - -	489	Bagabu islet - - -	362
-----, light - - -	490	Bagahak, mount - - -	174, 188
Argyll shoal - - -	112	----- point, range - -	189
Arkolon point - - -	377	Bagaisi islet - - -	361
Armstrong reef, beacon - -	190	Bagakai point, light - -	391
-----, clearing mark - -	190	----- to Kansag bay,	
Aroroy village - - -	492	coast	391
Arrow point - - -	669	Bagakay point - - -	434
Arturito islet - - -	497	-----, shoal southward	
Aru, tanjong, Marudu bay -	142	of	436
-----, Sandakan harbour	169	Bagalamatan village - -	657
Asgad point - - -	625	Bagalayag point, Katanduanes -	584
Asia anchorage - - -	373	-----, Mindoro - -	304
Asid gulf - - -	347	----- to Bogio point,	
Aslom islet, anchorage - -	316	coast	304
Aslum peak - - -	413	Bagamanok port, danger -	581
Astorga village, anchorage off -	697	-----, channel to	
Asturias town - - -	384	Port Anahao	582
Ataa islet - - -	470	-----, directions - -	581
Atimonan river, anchorage off -	544	----- town - - -	582
----- telegraph station, town	544	Bagambangan island, dangers -	81
----- to Roma point, coast -	545	Baganga bay, anchorage - -	640
Atjek rock, buoy - - -	170	----- river, town - - -	640
Atulayan bay, anchorage - -	590	Baganian peninsula - - -	663
----- island, anchorage - -	590	-----, east coast - -	670
-----, reefs off - - -	590	----- river - - -	669
Aubarede point - - -	535	Bagasipal islet - - -	497
----- shoal - - -	342	Bagatao island, lights - -	484
Aukwi islet - - -	637	Bago town - - -	372
Austin island - - -	81	Bagokay town - - -	594
Ayninan islet - - -	638		

	Page		Page
Bagolibud point - - -	651	Bakuhang island - - -	203
———, shoal south of		——— islet - - -	204
	650, 651	Bakun point, anchorage - -	290
Bagoso point - - -	639	——— river - - -	290
———, doubtful reef off -	640	Bakungan islet - - -	647
Bagtong point - - -	625	Balabac Great reefs - - -	118
Baguan island, discoloured		———, inshore channel 118	
———, water off	167	——— island, aspect, general	
———, rock reported		———, remarks 117	
———, north-westward of	167	———, east coast - -	119
Baguio, gale - - -	18	———, off-lying dangers 122	
Bagulayan point - - -	320	———, west coast,	
Bagunbanua islet, Masbate	345	———, dangers, directions 118	
———, Negros - - -	376	———, peak - - -	117, 118
Bagupantao point, anchorage		———, settlement, climate -	119
———, south-east of	344	———, shipping, water 119	
Bagutayok point - - -	477	———, telephone -	120
Bahakan bluff or headland	363	———, strait, general remarks 124	
Bahala island - - -	169	———, current, tidal	
Bai, pulo - - -	169	———, streams 124	
———, beacon east of -	170	———, eastern approach	
Baibai point - - -	494	———, off-lying shoals 135	
Baird point - - -	511	———, main channel -	128
Bais bay, dangers, directions	379	———, dangers N. side 128	
———, South - - -	379	———, dangers S. side 134	
——— harbour, directions -	379	———, directions 135	
——— point - - -	707	———, North - -	115
Bajapa reef - - -	185	———, directions 117	
Bakakai, mount - - -	555	Balabagan river, village -	679
——— point, shoal east of	555	Balabao point - - -	347
Bakakay island, rock off -	567	Balakai island - - -	586
Bakalan point - - -	653	Balamban bay - - -	384
Bakan island, banks east of	607	———, anchorage - -	385
———, shoals off - -	607	———, telegraph station, town 385	
——— to Manhud point,		Balambangan island,	
———, coast	607	———, general remarks 128	
Bakayauan hills - - -	670	———, dangers - -	129
Bakies point - - -	237	———, E. coast, shoals 130	
Bakiki islet - - -	281	Balambing channel, point -	284
Bakit bay - - -	84	———, directions to - -	285
Bakkungaan islands,		——— town - - -	283
———, Great and Little 166		Balanakan port, anchorage	470
Bako river - - -	309	———, directions -	471
Bakol island, buoy off - -	634	———, islets and	
Bakolod, anchorage off,		———, dangers 470	
———, telegraph station, town 372		———, tides - -	471
Bakon, anchorage off, town -	600	———, village - -	470
———, telegraph station, cable -	600	Balangan bay, anchorage -	663
Bakos islets - - -	309	Balangasan village - -	674
———, currents between -	309		
Baksal cove - - -	708		
——— to Talisay bay, coast 708			
——— islands - - -	524		
Baktol bay, anchorage - -	612		

	Page		Page
Balangona point - - -	576	Baluarte point - - -	634
Balangonan point - - -	452	Balubugan point - - -	385
Balanguingue islet - - -	496	Baluk river - - -	219
Balanguingui island - - -	257	Baluk Baluk island - - -	254
Balanguingui islands - - -	256	Balung river - - -	219
, tidal streams	257	and Sibetik island,	
Balangunan cove - - -	689	tidal streams between	228
Balaring point - - -	445	to Batu Tinagat,	
Balate point - - -	313	coast	226
and Abongabon		Balungungan island - - -	81
point, anchorage between	313	Balusingan bay, anchorage -	602
Balayan anchorage - - -	299	Balusuan islet - - -	211
bay - - -	298	Balut island, volcanoes - -	690
, tidal streams	63, 298	Bambagan reef; anchorage	
, winds - - -	298	inshore of	269
, light - - -	299	Bambannan island, anchorage -	295
, river, supplies, town -	298	, islands, N. of,	
, telegraph station, tide	299	caution	295
Balbagan islet, channel west of	357	Banahao, mount - - -	455
Baler bay - - -	537	Banakbok village - - -	553
, anchorage - - -	538	Banaran island, channel west of	283
to Dingalan bay, coast	538	Banate bay, town - - -	364
church, town - - -	538	Banbayan point, shoal south-	
Balesin island - - -	545	ward of	436
Balete point, reef off - - -	309	Bancaobancaon point - - -	99
port, anchorage - - -	642	Banco point - - -	653
Baliangao village - - -	448	Banda reef - - -	238
Balicuatro islands - - -	509	Bandayanon point - - -	586
point - - -	509	Banga, port, anchorage - -	649
to Port Palagag,		, danger, light - -	649
coast	509	, directions - - -	650
Baliguian islet, shoals off - -	362	Rangaan island - - -	648
Balikako point - - -	443	, light - - -	649
, reefs north of -	443	, reef east of,	
anchorage inside	443	clearing mark	650
Balikasag island, light - - -	406	Bangalao island - - -	257
Balin island - - -	359	Bangon town, anchorage off -	477
Balinatio islet - - -	627	Bangud islet - - -	337
Balingasag bay, anchorage - -	436	Banguay island, aspect, peak -	133
town - - -	436	, E. coast and	
Balino village - - -	493	dangers	135
Baliskan islet - - -	546	-, N. and N.E. coasts	133
Ballena rock - - -	636	, S. coast, islands -	138
Balmoral village - - -	169	, S.E. part, dangers	140
Baloi point - - -	448	Outer N.E. reefs,	
Balokbalok point - - -	562	clearing mark	135
to Kalwan river,		South channel - - -	137
coast	563	, dangers N. side	140, 141
Balolo point - - -	51	, S. side	151
Balseiro point - - -	259	, directions	154
Baltasar island - - -	472		
Baluagan river - - -	310		
, bar - - -	311		

	Page		Page
Banguay West channel, dangers, directions	132	Banton island, anchorage -	319
_____, northern entrance	131	_____, town, communication	318
_____, tides	133	Bantoncillo islet - - -	319
Bangui bay, anchorage -	527	Bantuin point - - -	477
_____, telegraph station, town	527	Bantulin point - - -	389
Bani channel - - -	511	_____, to Bingkay point, coast	389
_____, island, Samar - - -	510	Bao river - - -	413
_____, islands, Lamit bay -	566	Baquiao point, shoals north of	353
Baniaga reef and rock - -	43	Bar islet - - -	628
Banilad shoals, buoy - - -	393	Barabod point - - -	610
Bankal point - - -	42	Barao reef - - -	599
Bankalan island - - -	114	Bararin island - - -	67
_____, anchorage east of	115	Baras, port, Mindanao -	677
_____, reef - - -	115	_____, to Matiling river, coast	677
Bankari point - - -	614	_____, town, Katanduanes -	587
_____, to Cabra point, coast	614	Barbakan point, river, village	93
Bankauhang islet - - -	203	_____, range - - -	93
Bankawan channel - - -	141	Barbaza town - - -	325
_____, island, Balabac strait, reefs	137	Barcelona - - -	602
_____, islet, St. Michaels islands, dangers	74	Barceloneta village - -	559
_____, pulo, Borneo - - -	168	Barili bay, anchorage -	385
Bankoka, foul ground off -	159	_____, river, town - - -	385
_____, hill - - -	157	Barin island - - -	510
_____, to Labuk bay, coast	160	Baring, mount - - -	93
_____, north-east point -	156	Barotak bay, river, town -	364
Bankoran island - - -	74	Barrabas shoal - - -	428
Banku ru an cays - - -	163	Barraut reef - - -	149
Bankul bay - - -	359	Barrel rock - - -	679
Bankulin point - - -	638	Barren island - - -	87
_____, to Bislig point, coast	638	_____, tides - - -	88
Bankungan island - - -	260	Barrera, port - - -	491, 492
Banos point - - -	689	_____, anchorage, buoy -	492
_____, tidal streams - -	690	_____, communication -	492
Banot islands - - -	465	_____, light, tide, water	492
Bantak island - - -	49	_____, shoals - - -	492
Bantayan bay, anchorage -	514	Barton point, bank off -	90
_____, island, town - - -	380	_____, shoal off - - -	89
_____, village - - -	514	Barugo town, anchorage off	503
Bantigui point - - -	383	Basan reef - - -	648
Bantiki islet - - -	436	Bas-Bas channel, anchorage, directions	280
_____, point, Kolokonto bay	455	_____, island, Tawi Tawi -	279
_____, Pagbilao bay -	457	_____, point - - -	268
_____, Sorsogon, reef south-westward of	483	Bas Bas island, Pangutarang islands	294
Bantoliniao point - - -	391	Base reef - - -	60
_____, light - - -	394	Basey church - - -	632
Banton island - - -	318	_____, river, town - - -	630
		Basiad bay - - -	549
		Basiao island - - -	524
		Basianan bay, anchorage -	692
		_____, village - - -	692

	Page		Page
Basiauang bay, anchorage -	686	Batgonan island - - -	521
—— point - - -	686	Bati, pulo, anchorage south of	211
Basibuli islets and reef - -	283	Bati Laut, pulo - - -	211
Basilan group - - -	247	Batikual point - - -	706
—— island - - -	247	—— to Lilisan point,	
——, north-east shore -	252	coast	706
——, south coast - -	251	Bato point - - -	709
——, west and south		—— town, Katanduanes,	
coasts	250	anchorage for	579
—— strait - - -	244	——, Leite - - -	415
——, detached shoals -	245	——, Panay - - -	364
——, islands and		Batoan bay - - -	489
dangers	244	Batolaki bank - - -	264
——, light - - -	244	——, buoy, clearing	
——, tidal streams		mark	265
64, 245, 246		Batotindok point - - -	453
Basley island - - -	495	Battang point - - -	130
Basol island, Surigao strait,		Batu Bolu shoal - - -	253
tidal streams	419	——, tanjong, Marudu bay,	
—— islet, Davao gulf - -	692	pier southward of	150
Basot island, rock off - -	570	——, anchorage off	150
Bassa point - - -	700	——, Silam harbour -	195
Basun channel - - -	291	——, to Hastings	
—— islands - - -	289	point, coast	199
Bat island - - -	512	——, Tinagat - - -	227
Batag island, light - - -	605	——, mount - 212, 213	
Batalampon point - - -	454	——, tides - - -	228
Batan harbour, beacons, buoys -	596	Batua, mount - - -	279
——, coal, directions -	596	Batulaki bay, anchorage -	689
—— island - - -	591	Batulinao point - - -	529
——, coal - 591, 596, 597		Batumandi rock, caution -	255
——, south side - - -	596	Baturua*reef, tidal streams -	207
—— point - - -	351	Bauan and Batangas, anchorage	
——, shoal northward off -	353	between	300
—— port, Panay - - -	351-353	—— Pinamukan point,	
——, anchorage, buoys -	352	anchorage between	300
——, communication 352, 353		—— town - - -	300
——, directions, tides -	353	Baubaon point - - -	447
——, tidal streams - -	352	Baug river, village - - -	432
—— village, Batan island	596	Bauisa town - - -	264
—— port - - -	352	Baul islet - - -	626
Batangas anchorage, buoys -	300	Baverstock point - - -	259
—— bay - - -	300	Bay peak - - -	93
——, tidal streams - -	63	Bayan, pulo - - -	197
—— light - - -	300	Bayas isles, rocks off - -	360
——, telegraph station,		Bayatnan island - - -	425
town	300	—— and Guntuan	
—— to Matokot point,		channel between	426
coast	301	Baybay town, anchorage off -	414
Batas island - - -	81	——, communication -	414
Batauan bay - - -	384	Beaufort, mount - - -	99
Batbatan isle - - -	324	——, reef - - -	214
Bate channel - - -	116	Beeston, mount - - -	200
Bateria point - - -	101		

	Page		Page
Belan point - - -	260	Billean South dangers - -	163
_____ to Silangan point,		Bilok Bilok bank - -	284
_____ coast	262	Binabasalan islet - -	627
Belauan island - - -	256	Binagasbasan bay - -	567
Bello, port, anchorage - -	413	Binagon point - -	337
Belted Will rock - - -	67	_____, beacon, light -	338
Belzibub rock - - -	419	Binalaba island - -	60
Bengalet point - - -	299	Binalbagan point - -	597
Benkoka islet - - -	148	_____ town, telegraph	
_____ river, beacons, depth -	148	_____ station	373
_____, coast southward	148	Binalio islet - - -	518
Bennet bank - - -	313	Binanan islets - - -	364
Bennington bank - - -	66	Binarayan island - -	610
Bernardino, San, <i>see</i> San Ber-		Binatak point - - -	633
nardino.		Binatikan island, dangers -	85
Berrugosa point - - -	421	Bingay point and islet -	599
Bessie island - - -	105	_____ to Port Gubat,	
Beta shoal - - -	59	_____ coast	601
Biasong village - - -	413	_____ to Sugot bay,	
Bigaa - - -	4	_____ coast	599
Bihintinusa islet - -	251, 254	Bingkey point - - -	389
_____, bank eastward		_____ and Binongkalan	
_____ of 251,	255	_____ point, anchorage between	389
Bikobian port, anchorage -	535	Binigsian point, anchorage,	
Bikol river - - -	559	_____ water	374
_____, anchorage, buoys -	560	Binobolang point - -	415
_____, bar - - -	559	Binongkalan point - -	390
_____, directions, pilots -	560	Bintoulan island - -	276
_____, leading beacons -	560	Bintut islet - - -	78
_____ to Kalwan river,		Binuangan point, anchorage -	304
_____ coast	560	Binugayan bay, point -	613
_____ rock - - -	558, 561	Binulbulan island - -	81
Bikuin, mount - - -	406	Binulin river - - -	700
Bilaa point - - -	418	Binuluangan island - -	359
_____, anchorage on sand-		Binuni point - - -	440
_____ bank off	418	Binurun point - - -	586
_____ to Surigao, coast -	418	Bird islet - - -	92
Bilanbilan, anchorage off, light	419	Bird's nest caves - -	201
_____ to Tugas point,		Biri channel - - -	511
_____ coast	636	_____ head - - -	509
Bilanbilangan island - -	403	_____, rocks off - -	510
Bilanguan island - - -	295	_____ island - - -	509
Bilatan island - - -	284	_____, anchorages - -	510
Bilbao, mount - - -	592	Bislig bay - - -	638
Bilbogan, mount - - -	707	_____, caution - - -	639
Biliran island - - -	501	_____ point - - -	638
_____, islets and dangers		_____ town, anchorage off,	
_____ off	501	_____ supplies	639
_____, water - - -	501	Bisu Bintut islet - -	78
_____ strait - - -	502	_____ Bohan islet - -	78
_____ town, anchorage off -	502	Bisukay island - - -	67
Billean island or cay, dangers,		Bitaugan point - - -	708
_____ buoy	162	_____, reefs north-west of	709
_____ North dangers - -	162		

	Page		Page
Bitaugan point to Bato point,		Bohol island, currents south of -	451
coast	709	———, north coast -	403
——— river - - - -	709	———, islands and reefs	403
Bitinan island, tidal streams -	258	———, N.W. and W.	
Bito point - - - -	369	coasts	404
Biton bay - - - -	489	———, south coast -	407
Bivouac islet - - - -	91	———, W. coast, tidal	
——— point - - - -	102	streams	405
——— to Relief point,		Bojeador, cape, light -	526
coast, dangers	104	Boka reef - - - -	673
——— water - - - -	104	Bokbok point - - - -	457
Black islet - - - -	570	———, San Jose de, town	456
——— rock, Libarran island	166	Bolabok point - - - -	339
———, Paluan bay - - -	36	Bolai port, tide - - - -	691
———, South Taitai island -	87	Bold point - - - -	93
———, Tikao island, beacon	490	———, off-lying shoals -	96
———, Tub Bataha - - -	72	Bolho-on bay, bluff, town -	401
——— Watch rock - - -	134	Bolipongpong island, anchorage	268
Blake reef - - - -	184	Boloang island - - - -	521
Blanca point, Leite - - -	498	Bolobolo, town, water -	384
———, Panay - - - -	359	Bolod islands - - - -	255
———, Mindanao,		——— point - - - -	408
anchorage	450	Bolton, light, village -	694
Blind harbour - - - -	118	——— reef, beacon - - -	694
Bluff point, Kasiguran bay -	537	Bombon, mount - - - -	67
———, Mindanao, S. coast	689	——— point, Alad island -	337
———, Sibuguey bay - - -	646	———, Mindanao - - - -	447
Bo aan island - - - -	165	Bombong bank - - - -	504
Boacoa island - - - -	268	Bombonon point, tidal streams -	387
Boak anchorage, light - - -	472	——— port - - - -	374
——— river, town - - - -	471	Bonabona, settlement -	108
——— telegraph station, cables -	471	Bondog, Cabeza de, mountain -	464
Boal town - - - -	259	——— head - - - -	464
Boaya point - - - -	307, 308	——— peninsula - - - -	473
———, anchorage west of	308	———, tidal streams	63
Bobon, anchorage off - - -	513	——— point - - - -	464
——— church, river, town -	512	———, reef east-north-	
——— point, Mindanao - - -	641	east of	465
———, Samar - - - -	512	———, tidal streams -	473
Boca Engaño, port, directions -	480	——— to Arena point,	
——— Engañoso - - - -	481	coast	463
——— Grande, Port Sorsogon -	484	Bondok anchorage, shoals -	463
——— islets - - - -	480	———, directions - - -	464
Bocana bay - - - -	584	——— village - - - -	463
Bogio point - - - -	305	Bondulan point - - - -	328
Bognao inlet - - - -	43	———, shoal S.W. of,	
Bogo bay, anchorage - - -	388	buoy	327, 328
——— point, town - - - -	388	———, tides - - - -	335
——— shoal, buoy - - - -	394	Bongao island - - - -	286
Bogui point - - - -	560	——— port, anchorage -	286
Bohan island - - - -	78	———, directions, sup-	
Boheian island - - - -	205	plies, tides, tidal streams -	287
Bohi Dulong island - - -	205, 206	———, trusan - - - -	286
Bohihan island - - - -	204		
Bohol island - - - -	102		

	Page		Page
Bongaya river - - -	167, 168	Borongan port, directions -	619, 620
Bongo island, shoal westward of	682	———, lights - - -	619
Bontok, mount - - -	415	———, tide - - -	620
Boomboong island - - -	71	——— river - - -	619
Borak port, anchorage - - -	50	——— town - - -	620
Borbon town - - -	389	Borot cove, reef - - -	707
Borneo - - -	7	——— to Bais point, coast	
——— bank - - -	126	and reefs	707
———, British North - - -	8	Boston village - - -	639
———, area, population	8	Boswell island - - -	83
———, climate	8	Botak point - - -	692
———, communication	9	Botinagan bay - - -	584
———, company	8	Botlog island, anchorage	361, 362
———, harbours	8	Botogan point - - -	450
———, produce, trade	8	Bowen islet, dangers - - -	114
———, rainfall	8, 9	Brandon reefs - - -	146
———, standard time	10	Breakers reported, Sulu sea -	73
———, telegraphs	9	Breeches shoal - - -	667
———, temperature	9	British North Borneo Company	8
———, north-coast, islands and		Broken island - - -	82
dangers	151	Brooke, Sir James, point, light	107
———, north-east coast - - -	141	Brother islets, North and South	80
———, and off-lying islands	160	Bua point - - -	687
———, currents	176	Buad island - - -	525
———, off-lying banks	176, 177	Bual point, reef east of - - -	687
———, settlements	141	Buan island - - -	284
———, tides -	141	——— point - - -	641
———, wind and weather	11, 12	Buang bay - - -	497
———, north-west point - - -	142	Bu-a-ning islet - - -	157
——— rock, buoy - - -	170	Bubuan island, Sulu - - -	263
Bornugas, tanjong - - -	142	———, Tapiantana group	254
Borobaloto island - - -	521	———, Tawi Tawi group -	274
Borobodangan point - - -	508	Bubuday river - - -	670
———, tidal streams	509	Bubug point - - -	39
Borokay island, anchorage -	322	Budias point - - -	592
——— and Potol point,		Buenavista, San José de, <i>see</i>	
tidal streams between	322	San José de Buenavista.	
Borongan port - - -	618	——— town, pier, water,	
———, anchorage - - -	619	Guimaras	328
———, dangers - - -	619	——— village, Marinduque	471
		Buford reef - - -	678
		Bugao point - - -	580
		——— to Anahao point,	
		coast	580
		Bugason - - -	325
		Bugsanga point, river - - -	39
		Bugsuk island, dangers - - -	113
		Bugtun point, river, village -	514
		———, reefs and shoals off	515
		Bugtun island - - -	496
		Bugui island - - -	54
		——— point, light - - -	344, 491
		Buguias islet - - -	593

	Page		Page
Bugut port, directions - - -	390	Buol to Sulu roadstead, coast	
——— Lapid point - - -	290		259, 260
Bujimba, mount - - -	279	Buoy rock - - - - -	121
Buka point - - - - -	665	Buoyage, uniform system of,	
Bukas Conical mount - - -	426	Philippines	28
———, Great, island - - -	426	Bura point - - - - -	623
——— islands - - - - -	426	Burayot point - - - - -	527
Bukit Merkarah, hill - - -	170	Burdeus bay, anchorage - - -	542
Bukud point and hill - - -	687	Buri island - - - - -	521
———, shoal south-east of	687	———, anchorage - - -	521, 522
Bukutkut bank - - - - -	278	——— islet, Ambolon - - -	43
Bukutua island - - - - -	256	——— point, Masbate - - -	349
Bulakau point - - - - -	355	———, Luzon, rock off - - -	477
———, tidal streams - - -	63	Burias island - - - - -	478
——— to Gogo point,		———, caution - - - - -	481
coast	359	———, east coast - - - - -	480
Bulalakao bay, village - - -	315	———, islets and dangers	478
——— island - - - - -	54	———, rocky shoal	
Bulalaki point - - - - -	382		north of 479
——— and Chocolate		———, west coast - - - - -	480
island, anchorage between	383	——— reef - - - - -	708
———, tidal streams - - -	63	Burnside shoal - - - - -	348
Bulaluan point - - - - -	687, 688	Burs point, boundary beacon	
———, reefs off - - - - -	688		235, 237
Bulan anchorage,		———, coast south-west of	237
communication	486	Buruanga anchorage - - -	323
——— island - - - - -	256	Burubog point - - - - -	486
——— light, town - - - - -	486	Burungburungan island - - -	504
Bulanhau range - - - - -	110	Burunkan point - - - - -	45, 316
Bulatakay river - - - - -	695	Busainga port - - - - -	479
Bulato point - - - - -	447	———, directions, tides	480
Bulicutin islet - - - - -	258	Busan bay - - - - -	651
Buliluyan, cape - - - - -	112	———, anchorage - - - - -	652
Bulipatuid shoal, clearing mark	208	———, islets - - - - -	652
Bulu Bulu islet - - - - -	184	Busbus point, shoals off - - -	271
Buluan island - - - - -	652	Bush island, Mallawalle channel,	
——— river, village - - -	652	foul ground	159
Bulusan anchorage, town - - -	602	———, Taitai bay - - - - -	84
——— volcano - - - - -	602	——— islet, Deep bay - - - - -	98
Bum Bum island - - - - -	202	Busin island - - - - -	478
———, south coast - - -	214	——— port, anchorages - - -	479
Bum Bun river - - - - -	143	———, directions, tides,	
Bun-bun village - - - - -	260	water	479
Bunauan river - - - - -	703	——— to Port Busainga,	
——— to Tagum river,		coast	479
coast	704	Bushluk point - - - - -	271
Bunga point, Mindanao - - -	640	Busson rock - - - - -	262
———, Samar - - - - -	611	Busuanga island - - - - -	48
——— to Cabra point,		———, east coast - - - - -	50
coast	613	———, north coast - - - - -	48
———, Sulu, shoal off - - -	264	———, off-lying islands	
Bungul bungul island - - -	506	and dangers, depths	48
Buntud bank - - - - -	494	———, tide - - - - -	56
Buol town - - - - -	259		

	Page		Page
Busuanga island, west coast, off-		Campanario shoal, buoy -	394
lying dangers and islands	51	Campomanes anchorage -	373
shoal - - -	525	bay - - -	374
Butag bay, anchorage - -	486	to Duma-	
Butauanan bay - - -	563	guete point, coast	374
island, anchorage		Cana island - - -	100
off	564	_____, dangers off -	101
Buti hill - - - -	588	Canalizo strait - - -	655
Butun point, danger - -	129	Cañas bay - - - -	364
Butuan bay - - - -	431	islet - - - -	359
_____, depths - - -	432	Canon islet - - - -	98
town, anchorage,		Canton island - - -	557
supplies	433	Cap island - - - -	293
Butulan cove - - - -	689	Capines point - - -	629
Buyallao island, point -	315	Capitancillo islet, light -	388
Byan island - - - -	114	_____, reef north	
and Mantangule,		of	389
channel between, current,		Caraballos mountains -	29
depths - - - -	115	Carabaos, los, islets -	538
		Caramay port, town -	95
Caballote, mount - - -	422	Carbin reef - - - -	370
Cabarian point - - - -	475	Carlota islet, anchorage -	318
Cabeza negrito rock - -	490	Carmen bank - - - -	324
Cabezo de Bondog, mountain	464	_____, port, directions -	390
Tablas, peak - - - -	320	shoal, Leite - - - -	415
Cabezos shoal - - - -	503	_____, Negros - - -	370
Cabo island - - - -	666	Carrasco bank - - - -	343
Cabra island - - - -	32	Carrington reefs - - -	140
_____, light - - -	32, 297	_____, channel	
_____, tidal streams -	32	north of	140
_____, point - - - -	614	_____, clearing	
to Tubig river,		marks	141
coast	614	Cartagena anchorage -	373
Cadiz Nuevo, town - - -	370	bay - - - -	374
Caimanes Estero, anchorage	120	Casanayan town - - -	355
Cain reef - - - -	404	Castilla port, anchorage -	427
Cajui bank - - - -	40	town - - - -	485
Calabazas islets, anchorage,		Castle island - - - -	85
light	364	_____, Old, point - - -	84
Calatrava town - - -	377, 378	peak peninsula -	83, 84
Caldera bay, anchorage, coal	239	point - - - -	96
point - - - -	239, 454	Casuarina point - - -	103, 104
_____, tidal streams -	454	Cave point - - - -	511
to Samboanga,		Cays in Mallawallé channel	
coast	239	157, 158, 160	
Calver point, reef off -	102	Cazador point - - - -	299
Camp Overton, anchorage,		Cebu harbour - - - -	392
light	439	Celandat islets - - -	278
_____, directions -	440	Celébes sea, winds and weather	12
_____, telegraph		Cervantes river - - -	305
cables	440	Cervera bank, Sibuyan I. -	342
to Binuni point,		shoal, Panglao I. -	406
coast	440	Chambers knoll - - -	183
		Chance rock, caution -	224

	Page		Page
Channel islands, North and		Coal mines and deposits:—	
South	91	Philippine islands - - -	3
— rock, <i>see</i> footnote -	281	Silimpopon, Borneo - - -	233
Charuk island - - -	281	Cobrador island - - -	336
Charybdis bank - - -	96	—, light - - -	337
Cherif island, tide - - -	668	Cock's Comb islet - - -	342
— islands - - -	666	Coco island - - -	246
Cheron island - - -	54	—, Little, islet - - -	246
Chico, rio - - -	529	Cocoanut island - - -	511
China sea, currents - - -	19	— to Karanian,	
—, high water of wave		coast	511
from	64	Cocos islet - - -	570
Chinaman shoals - - -	66	Colla, gale - - -	17
Chindonam island - - -	54	Collins patch, caution - - -	222
Chinela islet - - -	356	Collinson island - - -	82
Chocolate island - - -	382	—, dangers off - - -	83
— and Malapascua,		Colorada point, Barrera port -	491
anchorage between	381	—, light - - -	492
Chongos anchorage, supplies -	287	—, Burias island -	479
Christmas island - - -	89	Columbia reef, buoy - - -	595
Church point, reef off - - -	110	Commerce, Philippine islands -	27
— reef - - -	208	Communication, British North	
Ciego port - - -	118	Borneo	9, 21
Cimarron islets - - -	565	—, Philippine	
Circe bank, Masbate - - -	347	islands	21
— sandbank, Tawi Tawi -	283	Compostela village - - -	391
— shoal, Paláwan - - -	111	Concas bank - - -	263
— shoals, East and West,		Concepcion port, Maestre de	
Sibuguey bay	658	Campo, anchorage	317
Clare shoal - - -	533	—, la, town - - -	317
Clarendon bay - - -	121	— town, Panay.	
—, buoys, directions	122	anchorage for	362
Claveria, anchorage off - - -	528	Cone islet - - -	131
— port - - -	527	Confites, las, reef - - -	537
Cleopatra island - - -	81	Confusion hill - - -	174
Cleopatra's needle, peak - - -	93	Connor, mount - - -	225
Cliff hill - - -	116	Consolacion, town - - -	416
— point, Mindanao - - -	693	Constancia rock, Mindanao -	436
—, Paláwan - - -	93	— shoal, Paláwan - - -	96
Climate, B.N. Borneo - - -	8	Consul, Vice, Iloilo - - -	333
—, Philippine islands - - -	3	—, Sebu - - -	397
Clotilde rock - - -	166	Cook channel, depths - - -	90
Coal - - -	21	—, directions - - -	91, 92
—, Caldera bay - - -	239	—, islets and dangers	91
—, Iloilo - - -	333	—, rock awash - - -	91
—, Isabela, la - - -	249	—, tidal stream - - -	91
—, Samboanga - - -	241	—, mount - - -	201
—, Sebu port - - -	397	Copia island, anchorages - - -	711
—, Sibetik island - - -	232	— village - - -	712
—, Sulu - - -	262	Coral bay, dangers - - -	110
Coal harbour - - -	596	— shoal south-east of	
—, anchorage, reefs -	597	Kagayan Sulu	78
— Mine reach - - -	230	Cordillera de Sugut - - -	682
— shoals - - -	230, 231	Cornelis peak - - -	229

	Page		Page
Coronada bay, anchorage - - -	452	Currents, Panaon and Kamiguin,	
----- point - - -	451	----- between	451
Corte, mount - - -	403	-----, Pangutarang group -	292
Cortes, town, Bohol - - -	406	-----, Pasco channel -	96
-----, Mindanao - - -	637	-----, Pusan point -	640
Cowie bay - - -	229	-----, Romblon island -	337
----- Harbour Coal Company -	231	-----, San Agustin cape -	712
Crawfurd cove - - -	106	-----, Sebu and Bohol,	
----- to Nose point, coast	106	----- between	410
Creagh reef - - -	214	----- sea - - -	410
Crest of Wave shoal - - -	273	-----, Sentry bank -	177
Cresta de Gallo islet - - -	342	-----, Sigboyé passage -	276
----- ridge - - -	326	-----, Sulade island -	264
Crook reef - - -	194	-----, Sulu sea -	19, 62
Cruz islands - - -	701	-----, Sumilan island, near	420
-----, shoal north of -	701	-----, Taganak island -	167
-----, point, shoal south-east of -	405	Cust reef and reef south-east of	221
Cuatro isles - - -	415	Cuyo island - - -	67
Cube rock - - -	608	-----, anchorage, buoys -	68
Cucaracha shoal - - -	356	-----, communication -	69
Cueva point - - -	480	-----, depths near -	68
Cuevas de Sojoton - - -	630	-----, directions -	68
Culebra island, Panay, shoals		-----, light - - -	68
----- north and east of	360	-----, supplies - - -	69
----- islet, Marikaban -	301	-----, tides, town -	68
Currents, Apo island and		Cuyos islands - - -	64
----- Negros, between	375	-----, tidal streams -	64
-----, Bakos islets, between	310		
-----, Balábac strait -	124	Daan Bantayan, town -	383
-----, North, strait	116	Dabun island, buoy off -	635
-----, Bohol, south of -	451	Dado islet - - -	81
-----, Borneo, north-east		Daet river, anchorage, buoys	556
----- coast	176	-----, communication -	557
-----, Byan and Mantangule		-----, directions, pilots	556
----- islands, between	115	----- town - - -	556
-----, China sea -	19	Daga reef - - -	373
-----, Engaño cape and		Dagat rocks - - -	576
----- Kamiguin island, between	533	Dagdap point - - -	549
-----, Equatorial - - -	18	Daguit island - - -	640
----- counter -	18	Dagupan - - -	4
-----, Guntuan passage -	429	Dahikan bay - - -	550
-----, Japan stream -	18	-----, directions -	551
-----, Malubutglubut and		----- to Port Mambulao,	
----- Linapakan islands, between	60	----- coast	551
-----, Memnon shoal -	75	----- islands - - -	550
-----, Mindanao, east coast	644	Daiquitin village - - -	471
-----, north coast	451	Daisy islet - - -	216
-----, Mindoro strait -	47	Dakio islet - - -	415
-----, Nasubatta channel -	123	Dakit point, shoal north of -	410
-----, Negros and Sikihor,		Dakit dakit rock - - -	506
----- between	410	Dako island, Negros - - -	379
-----, North Balábac strait -	116	----- islet, Siargao island -	427
----- channel -	122		
-----, Paláwan, east coast -	80		

	Page		Page
Dakula island - - -	- 666	Dapdap bay - - -	- 608
Dalaguete point, anchorage -	401	—— point, Iloilo strait -	368
——, tidal streams	387, 401	——, Luzon, S. coast	482
—— to Bolho-on,		—— reef - - -	520
—— coast	401	—— village, anchorage off-	412
—— town - - -	401	Dapitan bay, anchorage -	450
Dalanganem island - - -	92	—— port, tides - - -	449
Dalawan bay, anchorage -	120, 121	—— river and town - - -	449
——, reefs, supplies,		Daraga church, Luzon -	599
—— tides, water	121	—— town, Masbate -	349
Dalaynay islets, point -	584	Darahuay channel - - -	523
Daliaon, anchorage, reefs -	698	—— islands - - -	522
——, light, river, village -	698	Daram island - - -	524
—— to Dumalag point, coast	698	—— and Samar,	
Dalipé point - - -	325	—— channel between	524
Dalonan Manaol point -	640	—— to Hanabatas	
Dalrymple harbour - - -	258	—— channel, coast	525
——, anchorage,		Darby bank, caution - -	224
—— directions	259	——, clearing mark -	225
——, dangers -	259	Darokotan bay, point, dangers	off 80
——, tides -	259	—— island - - -	80
Dalumon island - - -	280	Daron village - - -	678
Dalupiri island - - -	507	Darsena island - - -	505
Damita islet - - -	518	Darvel bay - - -	186
Damitan village - - -	677	——, coast, aspect -	188
Damokan islet - - -	267	——, islands and off-lying	
Dampier point - - -	86	—— reefs	203-212
—— to Endeavour		——, southern shore -	202
—— point, coast	88	——, tidal streams -	187
Danahon bank - - -	403, 404	——, N. side	179
—— and Leite, channel		—— Tobacco Company -	194
—— between	403	——, topography -	191
——, directions, open-		——, winds and weather -	187
—— ings	403	—— peninsula - - -	190
Danao river, Negros - -	376, 377	Dassalan island, sheal off -	252
——, directions, tides -	377	Dato rock - - -	675
——, Sebu - - -	390	Datu Bato island - - -	295
—— town, anchorage off, coal -	390	Datum point - - -	231
—— to Bagakai point, coast,		—— rock - - -	144
—— anchorage off	390	Dauagon town - - -	383
Danaodanauan island -	420	Dauahon islet - - -	498
Danawan island, anchorage -	220	Dauan island - - -	251
Dangerous ground east of S.		Dauigan point, anchorage -	450
—— Taitai island	87	Dauin point - - -	375
—— point - - -	276	Dauis - - -	406
Danglay, mount - - -	632	Dauit point - - -	450
Danhugan island - - -	373	Davao, gulf of - - -	691, 712
——, rock north of	374	——, east shore -	705
Danlig village - - -	83	——, west shore -	691
Dansalan village - - -	671	Davao, anchorage, beacon -	699
Dao town - - -	326	——, communication -	700
Dapa anchorage, town -	428	——, pier - - -	699
—— channel - - -	428	——, light - - -	700
—— reef - - -	428	—— river - - -	699

	Page		Page
Davao river to Lanang point, coast and shoal	700	Digos river, village - -	695
——, tides, town - - -	700	—— warehouse - - -	695
Davie hill - - -	106	——, shoal south of	696
Dawson rock - - -	211	Dikabaito island - -	52, 60
Dayana island - - -	666	—— and Dikapululan, -	
—— point - - -	665	channel between	52
Dayap bay - - -	549	—— and Kulion, channel	
—— point - - -	548	between	52
—— to Dagdap point, coast	548	Dikalatan island - -	55
Deagan island - - -	490	Dikalungan peak - -	684
Deal point - - -	655	Dikapinisan point - -	538
Deception point - - -	110	Dikapululan island - -	52, 60
Deep bay - - -	96	Dilasak bay - - -	535
——, islands and dangers		——, West, bay, anchorage	536
——, off-lying banks - -	98	Diligan islet - - -	652
Del Monte point - - -	306	Dimalansan, port - -	534
Delconté point - - -	217	Dimanglet island, Kalamianes	54
Delian island - - -	51	——, Linapakan - -	60
Denson reef, buoy - - -	599	—— islet, Kalamianes -	55
Dent haven - - -	178	Dimankal island - -	60
——, anchorage - - -	179	Dimipak island - - -	48
——, banks - - -	178	Dinagat island - - -	420
——, directions - - -	179	——, west coast - - -	421
——, supplies, tides, tidal streams	179	—— town - - -	421
—— to Tanjong Labian, coast	180	Dinapiki point - - -	535
——, tidal streams	179	Dinaran island - - -	50
Deoto Bato island - - -	294	Dinas river - - -	670, 671
Derickson reef, buoy - -	595	—— town - - -	671
Dernasan island - - -	604	Dingalan bay - - -	538
Deseada point - - -	538	——, anchorage - - -	539
Destacado island - - -	506	Dingle point - - -	232
Dewhurst bay - - -	174	Dio islet - - -	631
——, tidal range - - -	142	Dipalian island - - -	54
Diablo point, light - - -	506	Dipolod islets - - -	256
Dialao point - - -	527	Dipulut islets - - -	256
Diamante shoal - - -	506	Disaster, cape - - -	116
Diangappik point - - -	260	Discovery bank - - -	46
Dibaibai point - - -	538	Distoring islet - - -	538
Dibatuk island - - -	50	—— Land point - - -	538
——, anchorage in bay		Distress signals - - -	5
N. of	50	Dit island - - -	65
Diboyoyan islet - - -	49	——, doubtful shoal	
Dichilem rock - - -	48	N.N.E. of	66
Didikas rocks - - -	534	Diutata point - - -	434
Digollorin river - - -	535	Diutay island - - -	379
Digos anchorage, directions	696	Divatu river - - -	199
—— islet - - -	695	Divilakan bay, anchorage	534
—— Outer reef - - -	696	Divinubo island - - -	618
—— point, reefs - - -	696	——, light - - -	619
		Dixon point - - -	259
		Divoryan cove - - -	585
		Docks - - -	21, 722
		Doha shoal - - -	381

	Page		Page
Dok Kan island, anchorage,		Dumali point, tidal streams	63
tides	294	Dumalin point - - -	454
-----, tidal streams	295	Dumangas point - - -	364, 365
Dolores river, town - - -	615	-----, buoys off	365
Dome island, rock awash off	82	Dumanhug point - - -	385
Dominga shoal - - -	46	-----, anchorage	
Don islands - - -	381	eastward of	386
Donauang island, shoals - -	686	-----, telegraph station,	
Dondonay island - - -	71	town	386
Dong Dong island - - -	267	-----, water - - -	386
Dongon bay, anchorage - -	39	Dumankilas bay - - -	665
point - - -	39	-----, anchorage	667, 668
Donjon sand cay and reef	40	-----, directions	667
Doong reef - - -	380	-----, islands in	666
Doorly patches - - -	125	-----, shoals in	
Donsol anchorage, light - -	482	approach	667
river, town - - -	482	-----, within	667
Doris point - - -	232	-----, tides - - -	668
Dos Amigos, port, anchorage,		----- point - - -	665
water	291	----- river - - -	666
-----, shoal in		Dumaquit point - - -	482
approach	291	Dumaran island - - -	88-90
Dos Hermanas, islets - - -	318	-----, dangers off	89
----- Hermanos peaks	677	-----, W. side,	
Double hill - - -	217	anchorage, reefs	90
island - - -	60	----- village, supplies -	90
Doubtful rock, Borneo E. coast	237	Dumbell island, dangers - -	86
Drake bank - - -	231	Dumunpalit island - - -	49
peak - - -	90, 93	Dumurug point - - -	495
Driftwood point - - -	174	Dumuy village - - -	698
Dromedary peak - - -	279	Dunaun island - - -	54
Dry bank - - -	265	Dungun point - - -	498
Duas point - - -	708	Dupon port, water - - -	500
Dugolaan point - - -	675	Dupulisan anchorage, point	673
Duguay Trouin shoal - - -	533	-----, reef - - -	673
Duke bank - - -	232	Dutch spit - - -	235
Dulag town - - -	635	Duyagan point - - -	314
Dulang-dulang rocks - - -	284	Duyon, trusan - - -	169
Dulho point - - -	406		
Dulhugan point - - -	500		
Dulunguin point - - -	452		
Dumagas river - - -	538	Earthquakes - - -	3
Dumaguete, anchorage, light	375	East Arm, Halsey harbour	53
point, river, town -	375	----- Banguey patches	137
-----, tidal streams	387	----- Batan Coal Company	596
-----, telegraph station,		----- Circe shoal - - -	658
cables	386	----- Guhuan islet, dangers	134
Dumagui islet - - -	674	----- hill, Banguey - - -	133
Dumalag island - - -	699	----- island - - -	106
----- shoals of - - -	699	----- Nalaut island - - -	52
point - - -	699	----- Nonokong island - -	237
----- to Davao, coast	699	----- peak, Palawan - - -	80
Dumali, mount - - -	311	----- point, Batan island	591
point - - -	311	-----, Samal island - -	700

	Page		Page
East point, Sibetik island -	235	Escucha islet, Luzon, N. coast -	530
banks and depths off	235	Eseo bank -	260
Eastern passage, Surigao strait,		España river -	339
424, 429		shoal -	496
Egbert shoals -	630	Espina point, light -	119
Egeria bluff -	143	Espiritu Santo, cape -	607
rocks -	157	Estagno island -	534
shoal, reef near, caution	224	Estampa point -	328
Egg sand, danger -	109	Estancia, anchorage, town -	360
Elax rock -	70	Esteban village -	599
Elcano shoal -	347	Estrella, anchorage off -	311
Elefante islet -	472	Eustasia point, shoal eastward	
, anchorage -	473	of 106	
Elephant island -	85	Evans island -	176
Elet patch -	51	Eve reef -	404
Ellis shoals -	125	Ewiig river -	100
Elonbachid island -	510		
Elopura -	171	Fairway shoal -	154
Elton bank -	170	Farol point -	435
Emmeline island -	104	Fatima islands -	666
Encanto point -	537	Favorite bank -	252
End hill, Borneo -	188	, clearing mark -	253
peak, Paláwan -	102	Fernandez point -	317
Endeavour point -	88	Filomena, Santa, shoals -	70
to High point,		Fin peak -	110
coast	92	First point -	142
Engaño, Boca, port, directions	480	Fisher shoal -	513
, cape -	530	Fitzgerald banks -	513
, anchorage, beacon	530	Five-feet patch, San Antonio	
and Kamiguin I.,		bay	109
channel between, currents,		Flaca point -	641
directions -	533	Flat hill -	167
, light -	530	island, Green island bay -	94
, rocks eastward of	530	Flat (Rasa) island -	103
Engañoso, Boca -	481	, tides -	104
, mount -	478	Flecha, mount -	668
English spit -	226	, anchorage west of	669
, tidal stream south-		point -	669
ward of	228	, anchorage off -	669
Entrance island -	550	, tidal streams -	669
Entry flat -	232	Floripon point, light -	352
Equatorial current and counter		Fly rock, clearing marks -	158
current	18	, reef south of -	158
Erzherzog reef -	223	Flying Fish rock -	165
Escalante bay, town -	376	Fondo claro, shoal -	56
Escarceo point, light -	307	oscuro shoal -	56
, tidal streams	63, 473	Foot island, anchorage south of	512
Escarpada island -	505, 506	Fortune island -	31
point, bank off -	533	Four peaks -	93
to Palanan		Framjee bank -	58
point, coast	534	Frances islet -	82
Esconchada point -	421	, dangers off -	83
Escucha (Phantom) island -	60		

	Page		Page
Frances reef - - -	184	Gatahang islet - - -	203
-----, tidal streams near	186	Gutas island - - -	666
Fraser island - - -	98	Gato island, Masbate - -	344
Fremantle shoal - - -	203	-----, shoal north-west of	343
Friar islet - - -	90	----- islet, Sebu I., north of	350
Friedrich haven, anchorage	225	Gatusan islets - - -	647
-----, directions	226	Gay island - - -	534
-----, tides, tidal		----- shoal - - -	345
----- streams	226	Gaya - - -	8
----- to Tawao,		Gazan, anchorage, town -	472
----- directions	228, 229	Gedeon shoal, buoy - -	100
----- reef - - -	223	Geladiok river - - -	485
Fronton Taragnan, headland	519	Gem reef - - -	177
Fuego point - - -	30	----- to Sibutu passage,	
Fulin island - - -	613	----- tide rips	180
		Gemok, mountain - - -	213
		General Alava bank - - -	98
		----- island - - -	636
		----- remarks - - -	1
		-----, Palawan I. -	79
		-----,	
		----- east coast	79
		-----, winds and	
		----- weather	10, 12
Gaba bay - - -	592	Genuruan islet - - -	501
Gabó channel - - -	421	Gerardo point - - -	546
----- port, anchorage, water	422	Getafe, village - - -	404
Gabung island - - -	114	Gibuson island - - -	421
Gage island - - -	52	Giffard islet - - -	197
Gaia, pulo - - -	205, 206	Gigantangan island - -	497
-----, anchorage, reef	206	Gigante, North, island, light	358
-----, water - - -	206	-----, South, island -	358
Gajo point - - -	600	Gigantes islands - - -	358
Galera point - - -	450	-----, tidal streams	63
-----, coast west of,		Gigoso point - - -	629
----- anchorage	451	----- to Capines point,	
----- port - - -	306	----- coast, shoals off	629
-----, anchorage - -	307	Gilbert island - - -	511
-----, light - - -	308	Gill point - - -	711
-----, north channel,		Gilutugan islet, shoal off	348
----- directions	306	Gimenez island - - -	82
-----, north-west channel,		-----, dangers off -	83
----- directions	307	Ginatilan, town - - -	386
-----, shoal, tidal streams	306	Ginatuan islands, passage, see	
-----, tides, village -	307	----- Guntuan.	
Gales of the Philippines -	17	Gingaanan bay - - -	586
Galintan, mount - - -	710	Gingog bay, village - -	434
Gallo Mallo channel - -	282	Ginitligan cove - - -	586
Galok island - - -	52	Ginn shoal - - -	111, 112
Galvaney islets, point -	477	Gipdo island - - -	420
Gamai point - - -	501	Glan river, village, water	688
Gandara river - - -	519	Glossaries - - -	ix.
Gandol island - - -	282	Gnat reef - - -	118
Ganon town - - -	267	Goat island, dangers off -	91
Gantung peak - - -	108		
Garcia Pitogo shoal, bank			
----- W.S.W. of	98		
Gardiner island - - -	105		
Garza island, passage north of	45		
Gasakan point - - -	670		
Gaspar island - - -	472		

	Page		Page
Gobongon river - - -	313	Greep reefs - - -	201
Goitya shoal - - -	238	Grenadas village - - -	422
Gogo point - - -	359	Griffin rocks - - -	252
-----, coast south of	360	Griffith point - - -	233
Golo island, anchorage -	35	Guadalupe village, reefs west-	
----- and Lubang,		south-west of	414
tidal streams between	35	Gual point and coast northward	689
Gondra islet - - -	268	Guangan peninsula - - -	641
Gorda point, Mindanao, E. coast	641	Gubat church - - -	601
-----, N. coast	436	----- port, anchorage,	
-----, N.W.		directions	601
----- coast	451	-----, tides - - -	602
-----, Ragay gulf - - -	474	----- town - - -	602
-----, shoal north-west of	475	Gubbins rock - - -	167
-----, Sebu, W. coast -	385	Gueritz rock, beacon - - -	143
Goreno island - - -	251	Guhangan island, rock north-	
Gorrion islet, shoal westward of	481	east of	260
Gorriti shoal - - -	349	Guhuan, East, islet - - -	134
Gorro peak - - -	268	-----, North, islet - - -	134
Govenen islands, Great and		Guihalo cove, village - - -	589
Little	250	Guiculugan river, anchorage off	378
Gran Laja islet - - -	530	-----, telegraph station,	
Granja, la, town - - -	509	town	378
Grassy point, Sibetik island -	230	Guilbay point - - -	477
-----, tidal streams -	231	Guimaras island, telegraph cable	328
-----, Timbu Mata -	209	----- strait - - -	330
Gray entrance, Dalrymple		-----, channels -	331
harbour	259	-----, directions,	
----- reef - - -	192	east channel	332
-----, beacon - - -	193	-----,	
Great Bakkungaan island,		main channel	331
dangers	166	-----, tidal streams -	332
----- bank, clearing marks -	245	Guinapak rocks - - -	534
----- Bukas island - - -	426	Guinayan islet - - -	349
----- Danger bank - - -	125	Guinayan, anchorage, town -	475
-----, sand cay -	126	-----, telegraph station,	
----- Govenen island -	250	cable	475
----- island (Santa Cruz) -	244	Guindauayan islet - - -	320
----- sandbank - - -	245	Guindulman bay, anchorage -	407
Green island, Kalamianes -	51	----- town - - -	407
-----, shoals off -	51, 52	Guinduyan point - - -	477
-----, Palawan, dangers		Guininyan island - - -	592
----- off	94	Guinjang islet - - -	427
-----, Samar - - -	512	Guinlabagan islet, shoals off -	348
----- bay - - -	93	Guinlabo islets - - -	67
-----, depths south-		Guinlepen island - - -	54
east of	95	Guintakan island - - -	381
-----, islands and		Guintinua island - - -	552
dangers	93-95	-----, anchorage -	553
----- islands, North and South	95	Guintubugan islet - - -	348
----- point, Dumarán island,		Guintunguan islet, dangers -	54
shoals off	89	Guion, town - - -	349
-----, Leite - - -	415	Guian bay - - -	626
		----- church, town - - -	628

	Page		Page
Guinan harbour, beacons, buoys	627	Hambly reef, islet south of	211
———, directions, tide	628	Hamorauan bank - - -	503
———, southern		Hanabatas channel - - -	634
channel, beacons	627, 628	———, buoy rock -	635
Guiuan peninsula - - -	625	———, light - - -	634
Guiuanon islet - - -	330	———, pilots -	632, 634
Gulisaan islet - - -	166	Hand rock, beacon, clearing	
Gull sand, dangers - - -	109	mark	225
Gum gum sungi - - -	168	Handayan island - - -	404
Gumaka town - - -	545	Haponan islet - - -	570
———, anchorage off -	545	Harbor island - - -	100
Gumalak island - - -	499	———, dangers off -	101
Gumalarang river - - -	250	Harbour shoals - - -	227
Gumaus bay, anchorage -	554	Hardy patch - - -	179
point - - -	554	Hare's ears, islands - - -	252
Gumay bay, directions -	609	Harvey reach, Serudong river	232
village, anchorage off -	609	Hasaan town - - -	437
Guntuan island, reef south-		Hastings island - - -	61
south-east off	425	——— point, reefs off -	199
——— and Bayatnan,		Hat peak - - -	110
channel between	426	Hatton, mount - - -	174
——— passage, Surigao strait		Haycock island, shoal north-	
424, 429		west of	51
———, currents, eddies,		and Green island,	
tidal streams	429	patches westward of line	
———, directions	429, 430	joining	52
———, islands in	425-428	Heel reef, shoal south-west of -	225
———, pilots - - -	429	———, caution - - -	224
Gusan village - - -	437	Hegad island - - -	263
Gusong, pulo - - -	168	Helm harbour, directions -	610
——— dilaut, reef, clearing		Herald point - - -	234
mark	196	Hermanas, dos, islets - - -	318
Gusun bank - - -	270	Hermanos, dos, peaks - - -	677
———, North, reef - - -	269	——— islets - - -	530
Gusungan islet - - -	217	Hermosa bank, point - - -	411
and Creagh reef,		Hernani river, village - - -	623
channel between, leading		Heron point - - -	100
mark - - -	217	Herschel, mount - - -	97
		Hervor rock - - -	567
Hagna town, anchorage off -	407	Hewett, mount - - -	201
Hagnaya bay - - -	383	Hiag bank - - -	281
Halcon, mount - - -	36	Hibitnil island - - -	383
——— rock - - -	253	Higan town - - -	267
Half Channel patch - - -	130	High island, Kalamianes - -	48
Halhat hill - - -	328	——— islet, Port Laguimanok -	458
Halian island - - -	428	point, Luzon - - -	550
Haligay river - - -	384	———, Palawan - - -	92
Halloran reef, beacon, clearing		———, sand cays and	
mark	193	reefs off	93
Halsey harbour, anchorage -	52	——— Table range - - -	81
———, tides, water -	53	Higunum rock - - -	609
Haluluko islet - - -	254	Hijo river - - -	704
		——— village - - -	712

	Page		Page
Hilaban island - - -	612	Howley island, dangers off -	95
———, anchorage -	613	Huag island - - -	552
Hilantangan islets - - -	381	Huak island - - -	505
Hilongos town - - -	415	Huban bay, anchorage -	506
Hilutangan channel - - -	404	Huevo bank, foul ground -	109
Himagaan bay - - -	481	Huidobro reef - - -	685
Himamailan river, anchorage off	373	Hull rock - - -	178
———, telegraph station,		Hunter rock - - -	47
town	373	Hurao hurao islet - - -	326
Himoto bay, anchorage, direc-			
tions	585		
——— village - - -	585		
Himugaan town - - -	370		
——— shoals N.N.E. of	370	Ibahay point, town, anchorage	
Himuguit river - - -	389	off	351
Himukitan island - - -	415	Ibus island - - -	677
Hinabuyan village - - -	498	Igan bay - - -	329
Hinamok island - - -	631	Igasan point - - -	260
———, pilots -	632	Igat bay - - -	665
Hinatuan town, supplies -	638	———, anchorage -	667, 668
Hindang town, anchorage for	415	———, directions -	667
Hingoso, anchorage, village	461	——— island, point -	665
———, reefs off -	461	Igbon island - - -	362
Hinondayan bay, anchorage	636	Iguana bank, buoys -	365
——— to Panaon		———, tidal streams -	366
strait, coast	626	——— island - - -	52
Hintotolo channel or pass -	356	Iguano island, dangers, bank	
——— island, light -	347	S.W. of	85
——— point -	346	——— and Elephant	
Hinunangan bay, town -	625	island, passage between	85
Hirapsan islet, anchorage -	515	Ikadambanuan island -	86
Hirigatungan point -	635	Ikolong island - - -	542
Hiuinatungan island -	611	Ilakaon channel, shoal in -	363
——— to Bunga		——— islet - - -	371
point, coast	611	Iligan - - -	439
Hiwata lake - - -	76	———, anchorage off -	439
Hog island, dangers - - -	93	——— bay, river - - -	439
———, sandbank west of -	94	———, western side, coast -	443
Holmes rock - - -	197	——— point - - -	534
Homalig island - - -	542	——— reef - - -	446
———, tidal streams -	542	———, telegraph station, cables,	
Homonhon island - - -	423	tides	439
———, anchorages -	424	Ilihan point, Katanduanes -	581
——— village - - -	423	Ilijan point, Luzon, S. coast -	303
Honda bay - - -	93	Ilin island, mount - - -	42
——— river - - -	241	——— rock - - -	41
Hood hill - - -	216	——— strait, anchorage in -	44
Hook bay, anchorage, directions	540	———, directions -	44
———, westward of	540	——— village, reef, anchorage off	42
Horadaba rocks - - -	580	———, supplies, water -	42
Horn rock - - -	453	Illan river, village - - -	93
Hospital hill, light - - -	439	Illana bay - - -	669
Hot springs - - -	600, 690	———, tidal streams -	669, 677
Howard shoal - - -	189	Ilog anchorage - - -	305

	Page		Page
Iloilo, anchorage - - -	334	Indan point and Daet river,	
——, buoys - - -	333	leading mark between	556
——, coal - - -	333	river - - -	555
——, communications - -	334	Indong islet - - -	92
——, directions from north-		Infanta, town - - -	539
ward and eastward	368	Information relating to charts,	
——, westward	327	&c. - - -	xv.
——, eastern route to, from		Ingalan island - - -	553
Verde island passage, direc-		Iniaoan, mount - - -	676
tions - - -	368	Iniyao islet - - -	622
Iloilo, eastern route to, in S.W.		—— to Agdan point, coast	622
monsoon, channels	336	Ilogiog bank - - -	331
——, lights - - -	332, 333	Ipil point - - -	341
——, meteorological table -	714	Iriron bay, anchorage - -	39
——, patent slip - - -	333, 722	rock - - -	39
——, pilots, tugs - - -	334	Iris shoal - - -	630
——, port regulations - -	5	Isabel islet - - -	318
——, province - - -	322	Isabela channel, directions	248, 249
——, repairs - - -	333	——, la, port - - -	247
——, river - - -	334	——, coal - - -	249
——, shipping, supplies,		——, dangers off - -	248
trade, water	333	——, naval establish-	
—— strait - - -	328	ment	249
——, N.E. entrance,		——, rock off coal	
directions	368	wharf	250
——, tidal streams	366	——, supplies, water	250
——, southern approach,		——, telegraph	
buoys, directions	327	station	247
——, tidal streams 63, 64,	335	——, tidal signals -	250
——, telegraph cables - -	334	——, tides and tidal	
——, tides - - -	335	streams	250
——, time signal - - -	7	Isarog, mount - - -	560
——, town and fort - - -	332	Isio town, shoal north of -	373
——, typhoon signals - -	334	Island bay - - -	105
—— Vice-Consul - - -	333	——, islets and dangers in	105
Ilok island - - -	81	——, off-lying dangers -	106
Imalaguan islet - - -	70	——, caution	107
Imaruan islet - - -	65	Iuahit (Puerto Princesa) -	99
Imbing, mount - - -	666	Ivantakut island - - -	634
Inagauan village, anchorage -	102	Iwahig river - - -	100
Inaguikan point, tidal streams	539		
Inampulugan island - - -	330	Jalaba point - - -	502
Inamukan bay - - -	446	Jaldan point - - -	326
point, port - - -	447	Jambongon island - - -	160
Inararan point - - -	486	Jamelo port - - -	30
Inaruntang point and coast		James patch - - -	184
south-eastward	151	Jamuarayon bay, anchorage -	476
Inatao bay, anchorage - -	439	point - - -	476
point, town - - -	439	Janigad island - - -	420
Inatoulán island - - -	628	Janoyoy islet - - -	427
Inayauan anchorage - - -	373	Japan stream - - -	18
Indagamy islet, rocks off - -	67		
Indan point - - -	555		

	Page		Page
Jaulo island - - -	549	Kabanatuan - - -	4
Java reef, clearing mark - -	74	Kabankauan island - - -	289
Jesselton, telegraph - 9, 145,	171	Kabatan river - - -	710
Jessie shoal - - -	127	Kabaun island - - -	511
----- Beazley reef - - -	73	Kabay bay, anchorage - -	621
Jesus point, Luzon - - -	550	----- to Tugnug point, coast	621
-----, bank off - - -	550	----- village - - -	621
----- to Port Mambulao,		Kabgan island, San Miguel bay	561
coast	550	-----, anchorage	
-----, Samar - - -	523	south of	561
Jibatan point, river, village -	518	-----, Surigao strait -	426
Jibitnil (Hibitnil) island - -	383	----- islet, Leite - - -	499
Jilantangan islets - - -	381	-----, Mindanao - - -	638
Jimenez, anchorage, directions,		Kabibijaban river - - -	475
town	444	Kabikungan point, river - -	527
Jinagnatan bay - - -	498	Kabilan islets - - -	420
Jinalinan town - - -	323	Kabilao island - - -	405
Jinatungan point - - -	635	Kabilauan island, anchorage -	48
Jobo islet, point - - -	638	Kabingaan island - - -	268
Johns reef - - -	579	Kablagna point - - -	629
Johnson island, dangers off -	95	-----, reefs off and	
Johnston rock - - -	166	clearing mark	629
Johnstone bluff - - -	144	Kabog islet, Sibuguey bay,	
Jolo, town - - -	261	W. side	648
Juan de Ilos, San, town - -	373	----- islets, Sibuguey bay,	
----- Pamplona, San, river -	528	E. side	656
Juanico San, <i>see</i> San Juanico.		----- point, Romblon - -	339
Julian, San, town - - -	617	-----, Sibuguey bay,	
Jumbit islets - - -	586	E. side	656
Junction point - - -	232	Kabsugan island - - -	426
June, 30th of, island - - -	103	Kabug point - - -	346
-----, off-lying		Kabugan islands - - -	635
shoals and rocky ground	103	Kabugao bay, dangers, depths -	579
Jurata, communication - - -	76	-----, directions, tides -	579
		----- island - - -	639
Kabadbaran town - - -	431	-----, anchorage	
Kabadea point - - -	597	north-west of	639
-----, light - - -	598	----- point - - -	328
Kabadlongan point - - -	628	-----, tides - - -	335
Kabahan islet - - -	321	----- river, village - -	579
Kabakian island - - -	420	Kabukan island, patch	
Kabalagnon point, anchorage -	330	westward of	263
Kabalanang island, buoy off -	633	Kabulan islet - - -	404
Kabalarian islet - - -	626	Kabulao bay - - -	407
Kabalata, mount - - -	684	Kabulauan island, anchorage,	
Kabalete island - - -	545	rock south-eastward of	61
Kabalian, mount, port - - -	636	Kabuli island - - -	80
----- point, Sulu - - -	264	Kabulig bay, anchorage -	437
-----, Tablas - - -	321	Kabusao village - - -	559
Kabalik point - - -	328	Kabut island - - -	657
Kabaloa island - - -	541	Kabuyok point - - -	469
Kaban islet - - -	301	Kadburauan, mount - - -	475
		-----, point - - -	475

	Page		Page
Kadiajan shoal, channels		Kaisian island, town	- 82
west and south of	269	Kajagnaán, town	- 415
Kadodiangan point	- 339	Kajidiokan point, town,	
Kaduayan village	- 260	supplies	340
Kaduruan point	- 349	Kakataan island	- 274
Kagamotan bay	- 610	_____, anchorage	
Kagan point	- 706	east of	277
Kaganuhan point	- 706	_____, banks off	- 275
Kagaray island, point	- 587	Kakraray island	- 592
Kagayan anchorage	- 437	_____, south side	- 597
_____, telegraph		_____, pass	- 592
station	438	_____, point	- 597
_____, island, reef, supplies	71	Kakub, port, tides	- 428
_____, Rio Grande de, Luzon	528	Kalaba islet	- 458
_____,		Kalabadian island	- 86
anchorages	529	Kalabagio island, anchorage	- 575
_____, bar	- 529	_____, shoal east of	576
_____,		Kalabakang river	- 230
buoy, light	528	Kalabanga river	- 560
_____,		Kaladis, mount	- 665
navigability	529	_____, point	- 663
_____, pilots	- 529	Kalagua islands	- 552
_____,		_____, anchorage	- 553
tides and tidal streams	529	_____, bank N.E. of	- 554
_____, river, Mindanao	- 438	Kalaguan island, anchorage	- 359
_____, anchorage off	- 438	Kalaitan channel	- 281
Kagayan Sulu group	- 76	_____, islets	- 281
_____, island	- 76	Kalajit islet	- 502
_____,		Kalalanag island	- 550
anchorages	76, 77	Kalambayanga island	- 551
_____,		Kalamianes, climate, general	
communication	76	_____, remarks	47
_____,		_____, and Paláwan,	
coral shoal S.E. of	78	tidal streams between	64
_____, tides	- 77	_____, shoals east and	
_____,		south-east of	58
supplies, water	76	Kalamion island	- 52
_____, town	- 438	_____, foul ground,	
Kagayançillo island	- 71	off-lying islands and dangers	53
Kagayanes islands and reefs	- 71	Kalampunian island	- 142
_____, tidal streams	- 64	Kalandórang bay	- 119
Kagbanlio point	- 629	_____, anchorage,	
Kagbulauan island	- 592	directions, tides	120
Kagdullon islands	- 522	Kalanaga bay, anchorage,	
Kagliliog point	- 563	_____, directions	591
Kagolong bay, anchorage	- 314	Kalangaan sand cay	- 161
Kagnipa island, anchorage	- 510	Kalangaman islet	- 389
Kagsao point	- 560	Kalanhayaun island	- 49
Kaguaian point, beacon off	- 633	Kalantas bank, clearing marks	- 504
Kagurai point, river, village	- 44	_____, tidal streams	- 504
Kahamkamman islet	- 136	Kalapadan bay, anchorage	- 587
Kahayagan island	- 605	_____, directions, reefs	587
Kahoagan islet	- 515		
Kaima bay, anchorage	- 477		

	Page		Page
Kanamay point - - -	379	Kapul island, light - - -	506
Kananai island, light - - -	634	Kapulaan bay, anchorage - - -	458
———, pilots - - -	632, 634	——— point, rocks - - -	475
Kanaron island, dangers - - -	61	Kapuntukan point - - -	598
Kanauay island - - -	634	Kapunuyupugan point - - -	636
——— reef - - -	601	Karabao island, anchorage, shoals off	322
Kanauayor islet, anchorage - - -	434	——— and Borokay, tidal streams between	322
Kandaraman island, inlet - - -	116	Karabuka point - - -	665
Kandolu island - - -	626	Karaga bay, anchorage - - -	640
Kandongos reef - - -	522	———, town - - -	640
Kangan point - - -	659	Karamoran, town - - -	577
Kangouak point - - -	341	Karamuan peninsula - - -	568
Kanigao island, light - - -	404	——— point, port - - -	572
Kanikian point - - -	705	——— to Rungus point, coast	572
Kanimeran island - - -	114	Karandaga island - - -	92
Kanimo island, anchorage - - -	557	——— islands, tides - - -	92
———, banks N.N.W. of - - -	556	Karangdato point - - -	267
———, light - - -	557	Karang-karang village - - -	259
——— pass - - -	557	Karanian channel - - -	512
———, buoy, pilots - - -	558	——— to Bobon point, coast	512
———, directions - - -	558	———, village, anchorage near	512
Kaninoan islet - - -	627	Karanisan point - - -	37
Kanipan bank - - -	687	Karigan point - - -	409
Kanipisan village - - -	310	Karigara, anchorage off - - -	502
Kanipo island, Cuyos - - -	67	——— bay, town - - -	502
——— islet, Kalamianes, shoal south-eastward of	58	——— light - - -	503
Kanitauan island - - -	58	———, telegraph station, cable	503
Kankabato bay, anchorage - - -	630	Karingo island - - -	558
Kankuman islet - - -	254	Karkar bay, church, point - - -	400
Kanlaon volcano - - -	369	Karnasa island - - -	350
Kanmanok hills - - -	405	Karogo island - - -	345
Kannomanda point - - -	617	Karongdong, town - - -	267
Kanoan port - - -	408	Kasapaan shoal - - -	282
———, directions, lights - - -	409	Kasauman point, water - - -	641
Kansaga bay - - -	391	Kasiguran bay - - -	536, 537
Kansilan point - - -	374	———, anchorage, directions	537
Kantilan reef - - -	637	——— town - - -	485
——— village - - -	429	Kasirahan islet - - -	92
Kantingas point - - -	340	Kasogoran bay - - -	423
Kanton (Canton) island - - -	557	Kasolgan passage - - -	592
Kapalai islet and reef - - -	221	Kasul bay - - -	447
Kapale, pulo - - -	205	Kasulian islet - - -	426
Kapalonga, town - - -	549	Katabanga bay - - -	477
Kaparan village - - -	652	———, anchorage - - -	478
Kapayas islet - - -	446	——— river - - -	478
Kapinas point - - -	618	Katadman point - - -	406
Kapiz bay, anchorage, tides - - -	354	Katadmon point - - -	390
——— province - - -	322	Kataingan port - - -	495
———, sea of, tidal streams - - -	356	———, anchorage - - -	496
———, town, telegraph station	354		
Kapnoyan islet - - -	70		
Kapor, tanjong - - -	142		
Kapual channel, island - - -	258		

	Page		Page
Kataingan, Tetas de, hills	- 495	Kauit, anchorage off, Kamotes	- 412
—— town	- 496	—— bay, anchorage	- 453
Kataisan point	- 630	—— island, San Miguel bay	- 560
Katalaban island, rock off	- 616	——, rock west of	- 561
Katanaguan islands	- 572, 573	——, quarantine station,	
——, shoals off	- 573	Sebu	394
Katanauan bay, directions	- 462	——, anchorage, buoys	
——, reefs eastward of	- 462		395, 396
—— to Ayoni bay, coast	462	—— landing	- 563
—— river	- 462	—— point, Albay gulf	- 600
—— town, communication	462	——, Bantayan, water	- 383
Katanduanes island	- 574-588	——, Marinduque	- 472
——, E. coast	- 579	——, Mindanao, E. coast	637
——, N. coast	- 574	——, reefs off, tidal	
——, S.W. coast	- 578	streams	C37
—— tidal streams	588	——, Mindanao, W. coast	453
——, W. coast	- 576	—— to Batotindok point,	
Katarman, anchorage, bay,		coast	453
—— village, Kamiguin	436	——, Sibuyan island	- 340
——, anchorage off,		—— strait, tidal stream	- 412
—— church, Samar	514	——, town, Sibuyan	- 340
—— point, Leite	- 414	Kauit town and Pagalad,	
—— to Amogotada		anchorage between	340
—— point, coast	414	Kauluan island	- 251
——, Mindanao	- 639	Kaulungan island	- 251
—— river, town, Samar	- 513	Kaunpan town	- 268
—— to Livas point,		Kavantiguianes islets	- 521
coast	514	Kavilli island, reef	- 72
—— shoal	- 513	Kawayan river	- 310
Katbalogan anchorage	- 523	—— village	- 514
——, dangers in approach,		Kaxisigan island	- 116
buoys	522	——, dangers off	- 117
——, directions	- 523	Kaygan islet	- 501
——, light	- 522	Kechil reef	- 165
——, north channel	- 523	Keerweer point	- 236
—— river, tides	- 523	Kelun point	- 561
——, south channel	- 523	Kennedy bay, anchorage	- 190
——, storm signals	- 523	Kestrel rock, dangers east of,	
——, telegraph station,		Balabac strait	135
—— cables	523	—— shoal, Mallawallé	
——, town	- 523	channel	165
Katbatan point	- 492	Kidamak bay, anchorage	- 680
Katel river	- 639	Kiddle reefs, clearing mark	- 200
Katmon town	- 389	Kiko shoal	- 428
Katpatin island	- 487	Kiminatn island	- 70
Katubeg reef, buoy	- 599	—— chico islet	- 70
Katubig river	- 604	Kimitad island	- 89
—— town	- 605	Kinabatangan hills	- 174
Katunangan point	- 500	—— river	- 174, 175
Katundulan point	- 481	——, bar	- 175
Kauanhahan point	- 476	——, tides	- 176
Kauayan islet, Cuyos	- 69	Kinablangan river, town	- 639
——, Karandaga islands	92	Kinabukasan point	- 563
Kaueli island	- 72		

	Page		Page
Kinabukasan point to Karamuan		Kolau hill - - - -	365
point, coast	564	Kolokonto bay, anchorage -	455
Kinagitnan bay, anchorage	509	and Tayabas	
Kinalang anchorage, water	439	river, anchorage between	456
Kinalasag island - - -	567	to Nayon river,	
passage - - -	568	coast	455
Kinamanuka island - - -	555	Kolokoto rock - - - -	48
Kinapagyan island - - -	557	Komagat rock - - - -	582
Kinapundan bay, directions	628	Komei Komeian island -	106
Kinapuran group - - -	276	Kominahuet point - - -	44
anchorges -	277	Komiran channel - - -	123
tidal streams	276	Danger bank - - -	123
island, reef - - -	276	island, shoals off -	123
tidal streams		Komot point - - - -	660
N. of	277	Konloai point - - - -	341
Kinapusan island, anchorage	77	Konsumala point, shoals off	341
Kini Balu, mount - - -	7	Kopton point - - - -	386
Kinilubaltan, tanjong -	163	Koromata bay, anchorage	675
spit off -	164	Koron bay - - - -	54
to Tan-		dangers, beacon -	55
jong Niug, coast	164	islands in - - - -	54
Kiniluban group - - -	64	western channel,	
anchorage -	65	islands in	55
Kinituai reef, buoy - - -	518	island, shoals off -	50
Kiot village - - - -	500	New - - - -	57
Kipit peak - - - -	652	directions to -	58
point, river - - -	450	passage - - - -	50
Kissing hill - - - -	196	directions -	51
Kiualan anchorage, water	439	point - - - -	58
Knob and Triple island,		Korumi hill - - - -	108
islets eastward of	81	settlement - - - -	107
Koamen islet - - - -	404	Kota Bato entrance,	
Koayan bay - - - -	660	Mindanao river	683
Koba islet - - - -	653	anchorage	
Kobo bay, anchorage -	577	off, buoy	684
village - - - -	577	directions	684
Kogton bay - - - -	407	hill, town - - - -	684
mount - - - -	403	Kotkot point - - - -	391
Kokaguayan point - - -	373	Kovitas island - - - -	570
Kokonongon point - - -	48	Kraan river, anchorage east of	687
Kokoro islet - - - -	69	village - - - -	687
Kolapis river - - - -	168	Kuabo bay, village - - -	709
Kolapsin point, shoal off	693	Kuad Basang island - -	275
Kolasi bay - - - -	504	Kub-kub islet - - - -	421
hill, Panay - - - -	354	Kubong - - - -	202
peak, Luzon - - - -	559	Kudao islet - - - -	495
point, Luzon, S.E. coast	503	Kudat, climate, communication,	
light, Panay -	354	jetty	145
San Miguel bay -	558	harbour - - - -	143
Sebu, tidal		anchorage -	144
streams	386	beacons, caution	145
town, communication,		dangers -	143, 144
Panay	324	directions -	144
village, Luzon - - -	559	landmarks -	143

	Page		Page
Kudat harbour, lights - - -	144	Labuk bay - - -	167
——, tides - - -	145	——, islets, tides - - -	168
——, settlement - - -	145	——, supplies - - -	169
——, shipping, supplies, trade	145	—— river, bar - - -	168
Kudungun, mount - - -	408	——, directions - - -	168
Kugasinan point - - -	548	——, tidal streams, tides	169
Kukuban cay - - -	159	Labukan point - - -	665
——, cay and coral		Lacud point - - -	640
—— patch eastward of	160	—— to Karaga bay, coast	640
——, dangers south-		Ladong river - - -	199
—— eastward of, beacon	159	Lagaoín Grande, bank - - -	314
Kukurayan inlet - - -	43	Lagara port - - -	315
Kukusan, mount - - -	212, 213	Lagarian point - - -	310
Kulaguhan village - - -	706	Lagassan town - - -	265
Kulasejang shoal - - -	441	Lagat island - - -	49
Kulasi bay - - -	364	Lagatic river - - -	352
Kulassan (Kulassein) island,		Lagonoy gulf - - -	588
—— doubtful islands off	292	——, head of - - -	589
Kuli Babang inlet - - -	215	——, north side - - -	589
Kulion bay - - -	54	——, south side - - -	591
—— island - - -	52	—— river - - -	589
——, islets south-east of	58	——, San Jose de, town - - -	589
—— port, anchorage - - -	56	Laguan bay - - -	604
——, communication,		Laguimanok point, village	458
—— trade	56	—— port - - -	458
——, directions - - -	57	——, directions - - -	459
——, fort, light - - -	56	——, islets and	
—— town, leper colony - - -	56	—— dangers 458,	459
Kulungan bay - - -	693	——, tides - - -	459
—— point - - -	693	—— to Tuquian	
Kumalarang river, village	666	—— point, coast, anchorage	459
Kumpang Kumpang island	218	Lagundi shoal - - -	394
——, reef and beacon south-west of	224	Lahad Datu - - -	194
—— river - - -	218	Lahanosa island, rocks off	427
Kunilan island - - -	294	Lahat Datu, anchorage, beacons	193
Kurianas islets - - -	60	——, communication - - -	194
Kuro Koaian islets - - -	520	——, dangers, beacons	192, 193
Kutkut point - - -	482	——, directions - - -	193
		——, settlement, supplies	194
		——, tidal stream - - -	194
La Union village - - -	708	Lahat Lahat island, Bambannan	295
Laa island - - -	285	—— islet, Basilan - - -	251
Laa island, anchorage N. of	288	Lahat-lahat islet, Kabukan	263
Labatan hill - - -	655	Lahuan point, anchorage west	
Labian, tanjong - - -	188	—— of	629
——, caution - - -	189	Lahuy island - - -	569
Laboyoan point - - -	652	Laia laia islets - - -	520
—— to Madiap		Lais village, communication	691
—— point, coast	652	Laja islet, shoal near - - -	568
Labuan - - -	9	Lajan point, hot spring - - -	690
—— rock - - -	132	Lajo island - - -	55
		Lakaron village, communication	691

	Page		Page
Lakaylakay point - - -	527	Langaran port, directions - -	447
Lakits, rocks - - -	252	_____ shoal - - -	447
Lalabuan river - - -	679	_____ town - - -	447
Lalabugan bay - - -	680	Langas island - - -	213
Lalauigan bay, water - -	44	Langasmate islands - - -	251
_____ island - - -	623	Langoi island, dangers off -	89
_____ point, Mindoro -	44	Languyon point - - -	384
_____, Samar - - -	618	Lanhil island - - -	246
_____ to Minasanagan		Lankang port - - -	89
_____ island, coast	620	Lankayan cay and shoals near	164
Lalim point - - -	651	_____, foul ground,	
Lallo - - -	629	_____ beacon 164, 165	
Lamak bay - - -	199	_____, shoals west and	
Lamanok point, shoals north-		_____ south-west	165
_____ ward of	407	Lantao islets - - -	542
Lambahon point - - -	640	_____ rock - - -	542
Lambusan river - - -	384	Laoang bay, anchorage, buoy -	604
Lamigan point - - -	641	_____ channel - - -	604
Laminusa anchorage, directions	270	_____ harbour, directions -	605
_____, tides and		_____ island - - -	604
_____ tidal streams	270	_____ town - - -	605
_____ island - - -	270	Lapa, mount - - -	422
Lamit bay - - -	565	Lapak island - - -	272
_____, anchorages, dangers	566	_____, anchorage - - -	273
_____, directions - - -	566	_____, dangers - - -	272
_____, eastern side - - -	566	_____, supplies - - -	273
_____, islands in - - -	566	Laparan island - - -	294
_____, western side - - -	565	_____, islands N.E. of,	
_____ islands - - -	566	_____ caution	295
Lamnuyan point - - -	291	Lapat point - - -	663
Lamon bay - - -	542	Lapinig bay - - -	610
_____, islands in - - -	545	Lapinigan island, Port Banga -	649
Lampaki islet - - -	674	_____ islands, Tumalung	
Lampassan island - - -	138	_____ bay	662
Lampinigan island, beacon,		Lapinin island - - -	402
_____ Basilan	247	Lapirauan, mount - - -	665
_____, bank N.W. of	248	Lapitan point - - -	677
_____ islet, shoal off,		Lapun Lapun island - - -	77
_____ Sibuguey bay	647	Lapuyan river - - -	666
Lampon port, anchorage, tides	543	Larapan island - - -	208
_____, rock south of -	543	Largo bank - - -	427
Lan dar gun peak - - -	108	Lasi bay, anchorage - - -	409
Lanan town, shoal off - -	321	_____ town - - -	409
Lanang point - - -	700, 703	Lasong river - - -	703
_____ to Hijo river, coast	703	Lataan island - - -	283
_____ river and coast		Latitude islet - - -	82
_____ southward	622	Latoan island, dangers - -	136
Lanao lake - - -	440	_____ patch, Outer - -	136
_____ village, anchorage off	412	Latuan island - - -	283
Lanauán island - - -	255	Lauangan village - - -	514
Lane rocks - - -	575	Lauis point, Bantayan - -	380
Langaan island, dangers -	166	_____, Maktan island -	392
Langaran port, anchorage -	447	_____, light - - -	395
		Laurel rock - - -	167

	Page		Page
Laui point - - -	329	Libagao island - - -	316
Lava island - - -	392	Libai village - - -	448
Lavezares, anchorage, directions	511	Libarran island, rocks off	166
—— town - - -	511	Libas cove, village - - -	354
Lavigan anchorage - - -	705	—— port, anchorage - - -	617
Lawigan point - - -	646	——, directions, tides - - -	617
—— to Bluff point,		Libjo, town - - -	421
coast	646	Libog, town, telegraph station	598
Lawler reef - - -	205	Liboho, town - - -	421
Layaban point - - -	446	Libukan islands - - -	520
Laylay river - - -	471	—— dako island - - -	520
—— village - - -	471	—— gutiai island - - -	520
Lazarino shoal, buoy - - -	393	Lights:—	
Lean islet - - -	65	Agbatan point - - -	338
Learmonth reef - - -	211	Agusan river - - -	432
Lebak point - - -	685	Ambolon island - - -	43
—— island - - -	686	Aparri - - -	528
——, shoal westward of	686	Apo island, Mindoro strait	45
——, port - - -	685	——, Negros - - -	375
——, anchorage - - -	686	Arenas point - - -	484
—— river, water - - -	686	Argos point - - -	490
Legaspi, dangers off, buoys	599	Bagakai point - - -	391
—— port, anchorage - - -	598	Bagatao island - - -	484
——, directions - - -	599	Balayan - - -	299
——, light - - -	598	Balikasag island - - -	406
—— reef - - -	599	Banga, port - - -	649
——, telegraph station, cable	598	Bangaan island - - -	649
——, tides, town - - -	598	Bantolinao point - - -	394
Legazpi, mount - - -	636	Barrera, port - - -	492
Lehnert reef, beacon, caution	224	Batag island - - -	605
Leigh strait - - -	237	Batan, port - - -	352
Leite bay - - -	500	Batangas - - -	300
—— island - - -	412	Bilanbilan - - -	419
——, communication - - -	413	Binagon point - - -	338
——, east coast - - -	635	Boak - - -	472
——, north coast - 500,	502	Bojeador, cape - - -	526
——, south coast - - -	415	Bolton - - -	694
——, west coast - 413,	497	Borongan - - -	619
—— town - - -	500	Brooke, Sir J., point - - -	107
Lelebun island - - -	626	Bugui point - - -	344, 491
Lemery, anchorage, town - - -	299	Bulan - - -	486
Lena shoal - - -	51	Cabra island - - -	32, 297
Leno bay - - -	685	Calabazas islet - - -	364
Leonan cay, dangers - - -	162	Camp Overton - - -	439
Leonidas shoal - - -	46	Capitancillo islet - - -	388
Letayen island - - -	663	Cobrador island - - -	337
Lete island - - -	581	Colorada point - - -	492
Leung point - - -	606	Cruz, Santa, harbour - - -	466
Levampa islet - - -	485	——, point - - -	697
Ley river - - -	657	——, Little, island - - -	244
Lian point - - -	475	Cuyo island - - -	68
Liang river - - -	30	Daliaon - - -	698
Liang bay, anchorage - - -	638	Davao pier - - -	700
—— town, supplies - - -	638	Diablo point - - -	506

	Page		Page
Lights:—		Lights:—	
Divinubo island - - -	619	Opon - - -	395
Donsol - - -	482	Ormok - - -	413
Dumaguete - - -	375	Overton, Camp - - -	439
Engaño, cape - - -	530	Palak harbour - - -	680
Escarceo point - - -	307	Palanog, port - - -	493
Espina point - - -	119	Palapag, port - - -	605
Floripon point - - -	352	Panabutan bay - - -	453
Galera, port - - -	308	Panirugan point - - -	631
Gigante, North, island -	358	Parang - - -	680
Hanabatas channel - - -	634	Pata point - - -	528
Hintotolo island - - -	347	Polo point - - -	442
Hospital hill - - -	439	Princesa, puerto - - -	100
Iloilo - - -	332, 333	Pujada bay - - -	642
Kabadea point - - -	598	Rapurapu island - - -	591
Kagayan, Rio Grande de -	528	Rasa islet - - -	421
Kalandorang bay - - -	119	Romblon, port - - -	338
Kalbayok - - -	519	Sabang point - - -	338
Kananai island - - -	634	Saboruko point - - -	100
Kanigao island - - -	404	Samboanga - - -	240
Kanimo island - - -	557	San Bernardino islets -	507, 603
Kanoan port - - -	409	— Jacinto, port - - -	488
Kapiz bay - - -	354	— José point - - -	488
Kapul island - - -	506	— Juanico strait - - -	631
Karigara - - -	503	— Miguel island - - -	488
Katbalogan - - -	522	— Nicolas church, Sebu -	395
Kolasi point - - -	354	— Pedro fort, Sebu - -	395
Kudat harbour - - -	144	— Vicente, port - - -	531
Kulion port - - -	56	Sandakan - - -	172
Lauis point - - -	395	Sandilands rock - - -	144
Legaspi - - -	598	Santa Cruz harbour - -	466
Linao point - - -	528	— island, Little - - -	244
Little Santa Cruz island -	244	— point - - -	697
Lucena - - -	456	Santiago, cape - - -	31, 298
Lusaran point - - -	329	Sialat point - - -	577
Makabalan point - - -	437	Siete Pecados islets -	366
Malabang - - -	678	Sir J. Brooke point - -	107
Malabrigo point - - -	303	Sula port - - -	598
Malalag bay - - -	694	Sulu harbour - - -	261
Malapascua island - - -	382	Suluan island - - -	422
Malinao - - -	594	Surigao - - -	419
Malitbog - - -	416	Taal - - -	299
Manbahao - - -	435	Tabako bay - - -	594
Manigonigo islet - - -	357	Tagolo point - - -	448
Maniguin island - - -	324	Tanguingui islet - - -	350
Mantiki point - - -	352	Tawao - - -	227
Margosatubig - - -	666	Tayabas river - - -	456
Matabeo islet - - -	490	Tidepole point - - -	100
Mataha island - - -	254	Totoog point - - -	506
Mati - - -	642	Ungay point - - -	591
Melville, cape - - -	118	Ligitan channel - - -	222
Nogas island - - -	326	—, tidal streams	222, 223
North Gigante island - -	358		
Okata island - - -	569		

	Page		Page
Ligitan group, islets and reefs	219, 220	Linkabo, pulo - - -	169
—— islet - - -	220	Linoas islet - - -	624
——, foul ground, tidal		Lintarkan island - - -	524
streams and overfalls off	220	Liogliog point - - -	524
—— reefs, clearing mark -	223	Lion bay - - -	416
Liguan, telegraph cable -	597	—— rock - - -	84
Liguasan marsh - - -	683	Lipa town - - -	36
Lihiman island - - -	165	Lipadas village - - -	698
Lihat Lihat channel - - -	281	Lipari island - - -	655
—— rocks - - -	278	Lipata, mount, Pagbilao chica	458
Likok point - - -	642	——, Samar - - -	509
Liktin point - - -	584	—— point, Luzon - - -	463
Lilisan point - - -	706	——, Panay - - -	324
Liloan point, Panaon island	417	——, Samar - - -	509
——, Sebu - - -	386	—— to Balicuatro point,	
—— and Tañon point,		coast	509
tidal streams between	386	——, Sebu - - -	393
——, anchorage, tidal		—— reefs, buoy - - -	394
streams	386	Lipusan bay - - -	613
—— port, anchorage,		Liscum bank - - -	660
directions	417	—— reef - - -	41
—— river - - -	391	Little Bakkungan island -	166
——, telegraph station, cables,		—— Coco islet - - -	246
town	391	—— Govenen island - - -	250
Lima point - - -	705	—— Kalupag island - - -	281
—— rock - - -	553	—— Malampa islet - - -	245
Limasana island, anchorage	416	—— Molleangan island,	
——, tidal streams -	417	dangers	139
Limawa village - - -	259	—— Naro islet - - -	348
Limbankauayan island - -	497	—— reef - - -	204
Limbayan island - - -	682	—— Santa Cruz island, light	244
Limbones island - - -	29	Liuyay islet - - -	449
Limbuak, plantation, river	139	Livas point, reef north-west of	514
Linampanan island - - -	583	Llagas, las, shoals - - -	343
Linao bay - - -	685	Llewellyn bank - - -	231, 233
—— point, light, Luzon -	528	Llorente, anchorage off, town	622
——, Mindanao - - -	685	Loay town - - -	407
——, Samal island - - -	700	Lobo, anchorage off - - -	303
—— shoal - - -	685	——, mount - - -	303
Linaon bay, anchorage -	373	Lobok cove, anchorage -	445
Linapakan island, anchorage	59	Lodo (Lode) bay, anchorage	506
——, passage west of	61	Lok Bakong hill, inlet -	216
—— strait, tidal streams		Loklabuan bay - - -	651
——	63, 64	Lokoloko point - - -	304
—— village, anchorage		—— to Bankiki	
N. of	60	point, coast	455
Lin-gi-san reef - - -	158	Lokot bay - - -	588
Linguion, mount - - -	598	—— islands - - -	588
Linguisan point, shoal patches		Loksiko bay - - -	655
—— off	649	Lokulan point, anchorage off	441
—— to Bagolibud		—— shoals - - -	441
point, coast	650	——, buoy - - -	442
Lininob rock - - -	43	—— village - - -	441
		Iolong point - - -	582

	Page		Page
Long reach, Simatahan river	- 234	Lumbukan Danger bank	- 124
Lo-og bay, Lubang	- 34	_____ island, dangers	- 123
Loog bay, Masbate	- 346	Lumintau point, doubtful	
_____, Samar	- 508	_____ shoal off	39
_____ point	- 508	_____ river	- 39
_____ to Mauo river, coast	508	Lumitis island	- 407
Look cove	- 30	Lumukluk river	- 492
_____ river	- 562	Lung bay	- 130
Loon point	- 405	Lungib point	- 548
_____, anchorage off	- 405	Lunod rock	- 520
_____ town, telegraph station,		Luniguigui island	- 668
_____ cable	405	Lupa island	- 284
Lopez bay, anchorage	- 545	Lupak point	- 471
_____ river, town	- 545	Lusaran point, light	- 329
Loran island	- 277	Luson islet, danger	- 55
Los Tres Reyes islands	- 472	_____, islet south of	- 57
Louisa shoal, clearing mark	- 134	Lutangan island	- 654
Low island	- 168	Lutao reefs, buoys	- 522
Low-hock peak	- 110	Luvas point	- 600
Loxdale shoal	- 127	Luyong point	- 625
Luangat point	- 271	Luzon island, area, population	
Luban point and islet	- 643	_____ 29, 526	
_____, anchorage north of	643	_____ and Lubang group,	
Lubang island	- 32, 33	_____ channel between, caution	31
_____ islands, anchorage	- 32	_____ and Tikao, tidal	
_____ town	- 33	_____ streams between	487
_____, Sulu	- 265	_____, east coast	- 535
Lubik islet	- 69	_____, winds	- 588
Lubug town	- 341	_____, north coast	- 526
Lubukan island	- 287	_____, north-east coast	- 534
Lubutglubut island	- 49	_____, south coast	455, 481
Lucena anchorage	- 456	_____, winds	- 473
_____, directions	- 457	_____, tidal	
_____, light, shoal south of	- 456	_____ streams	63, 473
_____, telegraph station, town	456	_____, south point	- 503
Lucia, mount	- 212	_____, south-east coast	- 588
Lucutan anchorage	- 641	_____, south-west coast	
Ludo point	- 613	_____ 29, 298	
Lug. port	- 320	_____ ,	
_____, anchorage, water	- 321	_____ depths off	30
Lugbung island	- 337	_____ ,	
Luginut isle	- 360	_____ tidal streams	63
Lugus island	- 268	_____ ,	
Lugusan river	- 372	_____ winds and weather	10
Luk Barábok Barábok	- 130	_____ reef, Basilan strait, and	
_____ bay, anchorage, supplies	- 34	_____ shoal S.S.E. of	245
Lukson point	- 629	_____ shoal, Sulu sea	- 66
Luksuhin islands	- 570	_____ village	- 706
Lumangbayan river, village	- 311		
_____ to Polak			
_____ bay, coast	311		
Lumbian island, anchorage	- 266	Ma la nut range	- 105
Lumbug cove	- 670	Maasin, anchorage, town	- 416
Lumbukan channel, directions	- 125	_____, telegraph cable, tide	- 416

	Page		Page
Mabahok cay - - -	161	Maglumba islet - - -	274
Mabintin, mount - - -	265	Magnagua, mount - - -	617
Mabio point, dangers off - - -	460	Magnana point - - -	617
Maboa point, shoal off - - -	642	Magpeos island - - -	276
Mabul island and reef - - -	221	Magpie bank - - -	177
—— passage, leading mark - - -	222	Magsatangi point - - -	559
Maca reef - - -	370	Magtimua rock - - -	505
Madai, mount - - -	200	Magul river - - -	199
——, sungi - - -	201	Magun, anchorage off - - -	643
Madaum river - - -	704	Maguran reef - - -	513
—— village - - -	712	Mahaba islet - - -	415
Madiaop point - - -	653	Mahinogo village, anchorage off - - -	435
Madilao point - - -	431	Maibun bay - - -	265
—— to Agusan river, coast - - -	431	——, anchorage - - -	266
Madre, sierra - - -	29, 526	——, buoy, dangers - - -	265
Madridejos village - - -	380	——, directions - - -	265
Madripore point - - -	110	——, tides and tidal streams - - -	266
—— to Rawnsley point, coast - - -	110	—— river - - -	265
Madukang island - - -	92	—— town, supplies - - -	266
Madumug islet - - -	470	Maiduun islets - - -	620
——, reef south-west of - - -	470	Maiga islet - - -	208
Mæander patch, Banguay south channel - - -	155	Main channel, Balábac strait - - -	128
—— reef, Sulu sea - - -	73	——, dangers N. side - - -	128
Maestre de Campo island - - -	317	—— S. side - - -	134
Mafsie, cape, reefs off - - -	147	—— directions - - -	135
—— to Melobong river, coast - - -	150	Mainit bay - - -	318
Magabao island - - -	638	Maitiaguit island, dangers off - - -	82
Magallanes bank - - -	58	——, off-lying islands east of - - -	82
—— bay, anchorage - - -	341	—— directions - - -	83
—— port, Sorsogon - - -	485	Majaba island, Maqueda bay, anchorage - - -	524
—— to Bulok point, coast - - -	486	——, Naranjos islands - - -	505
—— rock - - -	484	—— islet, Masbate - - -	345
—— town, Sibuyan - - -	341	Majinkil islet, reef west of - - -	204
Magalumbi island - - -	360	Majuyag, mount - - -	413
Maganting island, reef off - - -	204	Makabalan point, buoy, light - - -	437
Magapu point, anchorage west of - - -	676	——, telegraph cable - - -	438
Magdalena, mount - - -	212	Makadlao island, anchorage - - -	510
——, port - - -	492	Makahalar bay - - -	437
——, supplies - - -	493	Makaina island - - -	403
Magdug village - - -	706	Makalanhag island - - -	584
Magearagui island - - -	490	Makalayo island - - -	616
Magellan bay - - -	392	Makalbang point, anchorage - - -	384
Magellan's monument - - -	391	Makalelon, anchorage, town - - -	461
Magesang island - - -	510	Makambol point - - -	643
Maggie reef - - -	134	—— village, anchorage off - - -	643
Maglagabon point - - -	518	Makan islets - - -	605
Maglakob village - - -	292	Makangani island - - -	637
Maglubun point - - -	641	Makapilay - - -	409
		Makarilan islands, point - - -	581
		Makarite island, anchorage - - -	510

	Page		Page
Makate island, shoal north-		Malagusan point - - -	636
east of	616	Malahon island, shoal N.W. of -	51
Makaturin volcano - - -	682	Malajibomanok islet - - -	301
Makesi island - - -	97	Malalag bay - - -	693
and Reef island,		_____, anchorage - - -	694
rocky bank between	97	_____, dangers - - -	694
Makiliki point - - -	373	_____, directions - - -	695
Makilikian point, rocks off -	373	_____, light - - -	694
Makinit island and islets -	58	Malalimon point - - -	509
_____ islet - - -	51	Malamaui island - - -	247
Maklayao, mount - - -	463	_____ road, anchorage -	248
Makoto point - - -	476	_____, directions - - -	248
_____, anchorage S.E. of	476	Malampaya inner sound, path to	85
_____, shoal off - - -	476	Malanao island - - -	102
_____ to Pasakao, coast	476	Malanat islets - - -	542
Maktan island - - -	391	Malandok river - - -	326
_____ reefs, buoys -	392	_____ to Naso point,	
Makugil point - - -	484	coast	326
Makulabo island - - -	552	Malandong, tanjong - - -	190
Makulay island - - -	668	Malangaban island - - -	361
Makulmakul point - - -	605	Malanipa island - - -	245
Makutol river - - -	587	_____, Little, islet - - -	245
Malabang, anchorage - - -	678	Malantandan point, reef S.W. of	459
_____ and ports south-		Malapascua island - - -	381
eastward, directions	682	_____, anchorage - - -	381
_____, buoys, mooring buoys	678	_____, light - - -	382
_____, dangers in approach	678	Malaposo islets - - -	58
_____, landmarks - - -	677	Malarad islets - - -	572
_____, light - - -	678	Malasugat bay - - -	646
_____, river - - -	677	_____ point, shoal south of	646
_____ to Tetian bay,		Malasugue islet - - -	557
coast	679	Malatpuso rock - - -	85
_____, telegraph cable -	679	Malatuna point - - -	687
_____, wireless - - -	679	Malavatuan island, banks off -	35
_____ town - - -	677	Malavinuan cove, anchorage -	689
Malabrigo point, light - - -	303	Malayok point - - -	518
_____ and Escarceo points,		Malazon point - - -	543
tidal streams between	63	Malbinchilao island - - -	55
Malabug bay, point - - -	671	Malcampo bay - - -	498
_____, reefs in entrance	671	Malhon island - - -	423
_____,		Maligay bay, anchorage, reefs -	668
clearing mark	672	Malikut island, anchorage, tides	293
_____ point to Dupulisan		Malilipot, town - - -	594
point, coast	672	Malinao, port, Dinagat island -	421
Malabuktun island - - -	82	_____, light, town, Tabako bay	594
Malabungat island - - -	567	Malinsono island, dangers - -	114
Malabuyok town - - -	386	Malipano anchorage - - -	700
Malaga river - - -	635	_____, directions	701
Malagas point - - -	540	_____ islet - - -	701
Malaguit bay, anchorage - -	555	Malita village, communication	691
_____ river, village - - -	555	Malitbog, light, town - - -	416
Malagundi point - - -	303	Malkatop island, Busuanga -	55
_____ and Sigayan		_____ islet, Cuyos - - -	70
bay, anchorage between	304	Mallawallé channel - - -	157

	Page		Page
Mallawallé channel, dangers in		Manapla, town, shoals off -	371
centre, beacon	159	Manay village, anchorage off -	641
_____, dangers N.		Manbahao, anchorage, light,	
side	157	town	435
_____, dangers S.		_____, point, shoal east of	435
side	158	_____, to Mahinogo,	
_____, to Sandakan,		coast	435
caution	173	Mandan island - - - -	78
_____,		Mandani island - - - -	35
directions	172, 173	Mandaon, port, town - -	345
_____,		Mandaué tower, town - -	392
tides and tidal streams	173	Mandiralla island, foul ground -	159
_____, eastern dangers -	153	Mandul island - - - -	212
_____, island - - - -	153	Manga river - - - -	559
_____, cays near -	153	Mangal point - - - -	251
Malolo, mount - - - -	539	Mangalis point - - - -	262
Maltatayok island - - - -	55	Mangarin bay - - - -	40
Maltby island - - - -	102	_____, anchorage - -	41
Malubutglubut island - -	60	_____, directions - -	41
_____, and Lina-		_____, islets and dangers	40
pakan, current between	60	_____, tides - - - -	41
_____, observa-		_____, point, pier - -	40
tion spot	60	_____, village, supplies -	40
_____, tides -	60	Mangayao islet - - - -	458
Malugan point, reef - -	437, 438	_____, point, reef off -	418
Malumahuan island - - -	483	Mangkao point - - - -	384
_____, buoy S. of -	484	Manangkassar banks - -	236
Malusa bay, anchorage - -	250	_____, and Padang	
_____, islands west of -	251	bank, channel between	236
_____, tide - - - -	251	Mango point - - - -	466
_____, river - - - -	251	Mangsi channel - - - -	127
Malusi point - - - -	697	_____, directions - -	128
Mamad islet - - - -	256	_____, Danger bank - -	127
Mamanok island - - - -	257	_____, Great reef - - -	128
Mamanuk island - - - -	295	_____, islands, North and	
Mambagi shoal, clearing mark -	401	South	127
_____, town - - - -	401	Mangrove inlet - - - -	98
Mambahenauhan island - -	156	_____, point and islands -	178
Mambulao port, anchorage -	551	Manguinling island - - -	587
_____, town - - - -	551	Manhud point, dangers - -	608
Mamburao reef - - - -	37	_____, clearing	
_____, river, anchorage off	37	mark	609
_____, village, directions to	37	Maniakolat island - - -	274
Mampissin village - - - -	712	Manigonigo islet - - - -	356
Mamponon village - - - -	641	_____, light - - - -	357
Mamuyan river - - - -	174	Maniguin island - - - -	323
Manadi islet - - - -	40	_____, light - - - -	324
Managao point - - - -	389	Manikani island, anchorage and	
Manambrag point - - - -	577	channel north-eastward of	626
_____, port, anchorage -	577	Manila - - - -	3
Manamil islet - - - -	690	Manito reef, reef south of -	600
Manamok island, anchorage,		Maniuayan island - - - -	467
supplies	65	Manokmanok isles - - -	349
Manampili islet - - - -	214	Manote island - - - -	277
Manangula point - - - -	685		

	Page		Page
Mansaka point - - -	704	Maribohok bay, town - -	405
Mansalai bay, anchorage, direc-		Marigabato point - -	681
tions	314	to Panalisan	
village - - -	314	point, coast	682
Mansiol point - - -	315	Marigondon point - - -	481
Mantabuan islet, Darvel bay,		Marikaban island - - -	301
reefs off	207	, dangers -	302
island, Tawi Tawi -	283	, port, strait, village	302
and Lataan,		Mariki point - - -	242
channel between	283	Marikina - - -	4
Mantakwin bay, anchorage -	104	Marikitdakit islet - - -	630
, caution, tides,		Marili island - - -	55
water	104	, reef off -	57
Mantalinga islet - - -	355	Marinap bay - - -	486
Mantalingahan mountain -	108	Marindueque island - -	465
Mantangule island - - -	114	, east coast -	468
Mantiki point, light - - -	352	, north coast	465
Mantuaka point - - -	629	, west coast	469
Mantulary islet - - -	89	Maripipi island - - -	497
Manubol island, village -	273	Marisan reef - - -	522
Manuk Manka island - - -	284	Mark hill - - -	195
Manukan islet -	74	Marlanga, bay, point -	469
, islet and		, mount -	465, 469
shoal water off	75	Marongas island, anchorage	263
Manukan islet, anchorage -	71	Marowop river, bar - -	176
Manungut island - - -	257	Martin bluff - - -	259
Manyagui rock - - -	582	Martinez point - - -	287
Manyangit point - - -	130, 133	Marudu bay - - -	142-150
Mapaan point - - -	445	, anchorage, aspect	142
Mapait, town - - -	282	, catch factory,	
Mapanas bay - - -	608	anchorage off	149
Mapanga bay, river - - -	710	, eastern shore -	147
reef, clearing mark -	710	, land-	
Mapatag point - - -	325	mark	149
Maputi point - - -	439	, western shore -	142
Maqueda bay - - -	524	Marudu river - - -	146, 147
channel - - -	574	, anchorage off -	147
Marabout shoal - - -	106	, beacons -	147
Maragat island - - -	505	to Taritipan point,	
Marakanao island - - -	66	coast	147
Maralison islet - - -	324	Masagasai bay, anchorage,	
Maranas islet - - -	183	directions	468
Marangai point, reef off -	418	Masahuron island - - -	638
Marangas - - -	108	Masamat bay - - -	567
Marankalan point - - -	353	Masasungiao islet - - -	522
Maravilla island - - -	510	Masbate harbour - - -	493
Marban bank - - -	265	island - - -	344
Marchesa bay - - -	163	and Mindoro,	
, dangers -	164	tidal streams between	473
Marek point - - -	662	Samar,	
Margosatubig, fort, light -	666	islands between	496
Maria bay - - -	409	, tidal	
islet, Karnasa island -	350	streams between	496
, Talahit island -	497	and Tikao, pas-	
peak - - -	212	sages between	489

	Page		Page
Masbate island and Tikao, pas-		Matnog bay, tides - - -	505
sages between, directions 490, 491		——, town - - -	505
——, tidal streams 491		Matokot point - - -	302
——, east coast - 495		—— and Malabrigo	
——, islands south of 349		point, anchorage between 303	
——, north-east coast 491		Matos point, shoals off - -	286
——, south coast - 347		—— shoal - - -	262
——, west coast - 344		Matulin rock - - -	580
——, telegraph station, town 494		Matung point - - -	498
Masi river, anchorage off -	313	Matungan river - - -	146
Masin islet - - -	315	Matungun, mount - - -	142
Masinglok port, anchorage,		Matutum, mount - - -	688
tidal streams 243		Mauban bay, anchorage -	544
Masnou islet, rock N.N.W. of -	569	—— to Atimonan, coast -	544
Masterson point - - -	102	——, town, water - - -	544
Matabang river - - -	305	Mauo river, anchorage off, water	508
—— to Minolo point,		Maus mountain - - -	52
coast 305		May Williams shoal - - -	136
Matabao islet - - -	489	Mayabakan island - - -	91
——, light - - -	490	Maydolong village, anchorage	
Mataha island, light - - -	254	off 621	
—— river - - -	463	Mayo bay - - -	641
Mataking kechil, islet -	205	Mayon volcano - - -	598
——, pulo - - -	205	Mayraira point - - -	527
Mataling river - - -	677	—— to Pata point,	
Matalom, town - - -	415	coast 527	
Matanal, mount, point -	252	McKinlay reef - - -	212
Matandumaten rock - - -	553	Meara island, depths off -	98
Matanaye island - - -	248	Medano islet - - -	435
Matarabis islet - - -	67	Medellin town - - -	383
Matarinao bay - - -	623	Medio island, Busainga port	480
——, anchorages - 624		——, Galera port - - -	306
——, directions - 624		——, Naranjos group -	505
——, islands - 623, 624		—— reef - - -	554
——, shoals - - 624		Melau besar, hill - - -	142
—— point - - -	623	——, pulo - - -	146
—— to Sungi point,		Melchor island - - -	472
coast 625		Melobong river, approach,	
Matatindok point - - -	374	directions 150	
Mataya island - - -	50	Melville, cape, dangers, light	118
Matayon point - - -	495	Memnon shoal, current, tide-rips	75
Mati, anchorage, light -	642	Menor islet - - -	46
——, communication, town -	642	Mercedes, communication -	557
Matiao river - - -	642	——, port - - -	556
Matimus point, coast eastward of	679	Meridian reef - - -	183
——, shoals off - - 679		Merlin point - - -	232
—— river, village - - 679		—— rock - - -	159
Matina village - - -	698	——, trusan - - -	234
——, anchorage off - 699		Merope rock - - -	47
Matinao river - - -	615	Merrett reef - - -	201
Matlang bay, village - -	500	——, patch eastward of 202	
——, water - - -	500	Mesa island - - -	497
Matnog bay - - -	504	Meteorological table, Iloilo	714
——, directions - - 505		——, Sandakan 713	

	Page		Page
Miaili cove - - -	580	Mindanao river, anchorage off,	
Miangas island - - -	712	buoy	684
, anchorage, tidal		, directions -	684
streams	712	, Kota Bato en-	
Mid-channel bank - - -	274	trance, bar	683
, anchorage -	277	, landmarks -	683
, tidal streams	278	, light -	683
Middle channel, Balábac strait,		, south entrance	684
directions	126	to Tapanian point,	
reef, Borneo, anchorage	183	coast	685
, Rapurapu strait -	595	Mindoro island - - -	35, 36
, Sibulan port -	664	, coal - - -	3
shoals, Balábac strait -	126	, east coast -	313
Milagros, port, telegraph cable	347	, islands east of -	317
Minaaso islet - - -	583	, north coast -	304
Minabalay island - - -	587	, north-east coast	310
Minadion islet - - -	623	, west coast -	35-45
Minaloa islet - - -	623	sea, tidal streams -	64
Minalutan, bay, point -	409	shoal - - -	253
Minanga bay - - -	50	strait - - -	45
Minanut anchorage, island	621	, current,	
, directions	621, 622	weather	47
Minas, port - - -	589	, tidal streams -	63
Minasangan island - - -	621	Minglanilla, town - - -	399
Minasawa island - - -	542	Minigil island, point -	580
Mindanao island - - -	430	Minilay island - - -	54
, coal deposit -	657	Minis island - - -	263
, communica-		Minna reefs - - -	156
tion	431	Minolo point - - -	305
, east coast -	637	Mintag point - - -	496
, currents	644	Minusuong river - - -	503
, north coast -	431	Mirigil point, reef - - -	36
, currents	451	Misamis, port - - -	440
, winds	451	, anchorage -	442
, north-east		, dangers -	441
coast	636	, depths -	440, 441
, and off-lying islands	418	, directions -	442
, north-west		fort - - -	441
coast	450	, shoal and buoy	
, provinces of -	431	eastward of	442
, south coast -	645	, clearing mark	442
, southern		, telegraph station,	
peninsula of	688	cable	443
, west coast -	452	, tides and tidal streams	443
, tidal streams	64	, town - - -	443
, south-west		Misan Misan reef - - -	195
end of	239	, clearing marks	196
river, or Rio Grande de	683	Misua creek, anchorage off -	542
		Mitford harbour - - -	139
		, anchorage -	139
		, east entrance,	
		beacons	139

	Page		Page
Mitford harbour, east entrance,		Mugnuga village - - -	712
directions	140	Muhuy point - - -	327, 328
_____, middle en-		Mulanai, anchorage, church,	
trance	139	town	463
_____,		_____, coast south of - - -	463
directions	140	Muligi islands - - -	78
_____, settlement,		_____, shoals south-west of	156
tide, water	139	_____, W. by S. of	
_____, west en-		155, 156	
trance	139, 140	_____, patches - - -	155
Mitra, mount - - -	458	Murcielagos bay - - -	447
Moalbual town - - -	386	_____, islets, anchorage	451
Mobai islet - - -	353	Murotai river - - -	229
Mobo bay, anchorage - - -	494	Mutul, anchorage, town - - -	688
_____, shoal, town - - -	494	_____, river, water - - -	688
Modok river - - -	662		
Modum island - - -	139		
Moises, mount - - -	534		
Mokabok islet - - -	404		
Mokabok point - - -	376		
Moko bay - - -	290		
Molar rock - - -	569		
Molleangan island, dangers -	138		
_____, Little, island,			
dangers	138		
Molo, church - - -	327	Nababui island - - -	634
Molokabok island, shoal N.E. of	370	Nabalas village - - -	368
_____, and Don islands,		Nabat islet - - -	84
channel between, caution	370	Nabolet point - - -	301
Mombanen island - - -	82	Nabugtusan island - - -	610
_____, danger off - - -	83	Nabugtut islet, Asid gulf - - -	349
Mompog island - - -	468	_____, Masbate W. coast	345
_____, pass, tidal streams -	63	Nabulao bay - - -	374
Monad shoal - - -	382	Nabunut islet, shoals off - - -	357
Mondragon, town - - -	514	Naburul islet - - -	328
Monk point - - -	232	Naburut islet - - -	361
_____, and Friar islets - - -	90	Nadulao island - - -	331
Monmouth shoals - - -	156	Naga town, anchorage off - - -	399
Monte, point del - - -	304	Nagaha bay - - -	622
Montero island - - -	82	_____, anchorage - - -	623
_____, shoal - - -	343	Nagarao islet - - -	349
Montokonan islet - - -	423	Nagnasa island - - -	510
_____, anchorage - - -	424	Nagos, tanjong - - -	221
Montufar point - - -	601	Nagsilag point - - -	585
Moorhen reefs, clearing marks -	200	Nagtig islet - - -	355
Morgan point - - -	531	Nagubat island, Semirara - - -	316
Moro island, dangers E.S.E. and		_____, islets, Mindanao - - -	426
W. of	248	Naguiba point - - -	310
Mosquito rock - - -	157	Nagumbuaya point - - -	588
Mostyn, mount - - -	201	Naguran islet - - -	347
Moysey shoals - - -	227	_____, islets and shoals off	348
Moyune shoal - - -	74	Nahibil point - - -	618
Mubu point, water - - -	262	_____, to Anitaguipan	
Muda island - - -	666	point, coast	618
Mugnuga bay - - -	711	Nahuan islet - - -	280
		Nailog river - - -	341
		Nailon point, Panay - - -	353
		_____, Sebu - - -	388

	Page		Page
Nalaut island - - -	51	Nayon river, dangers off - -	456
——, shoals off - - -	51, 52	Nazaret village - - -	706
——, East, island - - -	52	Negra point, Luzon - - -	527
Nalunga island - - -	330	——, Paláwan - - -	84
Nalupa town, dangers off - -	325	Negros island - - -	369
—— to Dalipé point, coast -	325	—— and Sikihor, cur-	
Nanga islands, Linapakan -	60	rent between - - -	410
—— islets, Busuanga - - -	49	——, coal - - -	378
Nangaba islets - - -	426	——, east coast - - -	376
Nangalao island, dangers - -	61	——, north end, tidal	
Nangan bay, anchorage - - -	706	streams - - -	64
—— point - - -	453	——, north point - - -	371
Nanu island - - -	403	—— to	
Napakao point - - -	407	Pandan point, coast - - -	371
Napakol point - - -	606	——, north and north-	
Napayauan islet - - -	345	west coasts - - -	369-373
Napla bay, anchorage - - -	618	——, south-east coast,	
Napolo point - - -	446	tidal streams - - -	387
Nara point - - -	685	——, south-west and	
Naranjos islands - - -	505	south coasts - - -	374
——, anchorage,		——, telegraph cables - -	369
depths - - -	506	——, west coast,	
Naro bay - - -	494	anchorages - - -	373
—— island, bank south-east of	348	—— occidental - - -	369, 372
——, Little, islet - - -	348	—— oriental - - -	369, 375
—— town - - -	495	New Orleans point - - -	531
Narvaez bank, Sulu Sea - - -	59	—— Washington - - -	352
—— reef, buoy, Sebu - - -	394	——, anchorage outside - -	351
—— shoal, Misamis port - -	441	——, communication - - -	352
Nasipit harbour, anchorage -	433	Nichols reef - - -	204
——, directions - - -	434	Nicholson banks - - -	71
—— town - - -	434	—— reef - - -	73
Naso point - - -	326	Nin banks - - -	345
Nasog point - - -	323	—— bay - - -	345
Nasubatta channel, current,		——, abnormal variation - -	346
tidal streams - - -	123	——, anchorage, water - -	345
—— island and reef - - -	122	——, tides - - -	346
Nasugbu, bay, town - - -	30	Nino, Santo, bay, town - -	497
——, communication - - -	30	Nipa Nipa island - - -	197
—— point - - -	30	—— point - - -	354
——, anchorage - - -	31	——, rocks off - - -	355
——, dangers off - - -	30, 31	——, telegraph cable	
Natangdol, mount - - -	42	east of - - -	355
Native point, reef off - - -	103	—— to Pirara point,	
Natives, caution regarding -	250,	coast - - -	355
279, 686		Niug, tanjong - - -	167
Nato village, anchorage off -	590	Noche Buena channel - - -	281
Naujan, church, port, town -	311	——, directions - - -	282
Nauka point - - -	349	Nogas island, light - - -	326
Navahay island - - -	635	Nonok island, village - - -	420
Navigation, notes on - - -	xv.	Nonokong, East, island - -	237
Navotas river, village - - -	310	Normanby bank - - -	177
		Normanhurst reef - - -	212
		Nortada, gale - - -	18

	Page		Page
North and South Green islands,		North-east shoals, Lumbukan -	123
Paláwan	95	Northumberland strait -	47
rocks, Paláwan	81	North-west bank, Kagayan Sulu	77
Arm, Halsey harbour -	52	, clearing mark	77
Balábac strait -	115	islet, Mallawallé -	153
, current -	116	rock, Busuanga -	48
, directions	117	, Sibuguey bay	659
, islands on		shoal, Ramos island	116
south-west side	116	N.W. and North Borneo dangers	
Borneo, British -	8	151, 152	
Company, British	8	shoals, Great Danger bank	126
dangers -	151, 152	Nose point -	106
Exploration		, off-lying shoals -	108
Company	150	, reef W.S.W. of -	107
Brother islet -	80	to Segyam islands,	
channel, Balábac, caution,		coast	107
current, tidal stream	122	Notch hill -	174
, shoal in fairway		Nueva Caceres, pilots -	558
122, 123		, town, Luzon -	559
, Galera port,		, village, Sebu -	401
directions, shoal	306	Nulton point -	531
Gigante island, light -	358	, reef west of, buoy	531
, bank		Numancia village -	428
north-eastward of	358	Nunan point -	488
, isolated		Nuñez shoal -	389
shoals off	359	Nunukan island -	237
Guhuan islet, dangers -	134	Nunuyon Derat island -	169
Gusun reef -	269	Laut island -	169
harbour, Balambán -	130	Nusa Lajit island -	289
, anchorage,		Takbu channel, reef -	291
directions, water	130	island -	289
hill, Banguay -	133	Nusatonga islet -	214
islet, Mallawallé -	153	Nymphe reef, clearing marks -	175
, Tabgon -	571		
Mangsi island, dangers -	127		
patches, Great Danger			
bank	126		
point, Bais harbour -	379	Obando mole -	102
, Busainga port -	480	Observation point, Halsey har-	
, Medio island, Galera		bour	53
port	306	spot, Malubutglubut	60
rock, Busuanga -	48	Observatory island -	60
, Paláwan -	81	point, Balambán-	
spit, Puerto Princesa,		gan	131
clearing mark	99	Ochoa bank -	346
Taitai island -	86	Odel island -	251
Ubian island, bank off -	293	Odiangan village -	434
, anchorage	293	Odiungan, town -	320
, Bambannan		Ogton point, anchorage -	381
and Laparan, caution between	293	Oil, Leite island -	413
North-east bank, Kagayan		, Sebu island -	382
Sulu, anchorage	77	, Tayabas province, Luzon -	456
, clearing mark	77	Okata island, light, rocks off -	569
bluff, Simaddel -	160	Okbok hill -	352

	Page		Page
Oko islet - - - - -	65	Pabellones islands - - - - -	85
— river - - - - -	580, 582	Pacheco shoal - - - - -	70
Okre point - - - - -	376	Pacific, wave from, high water -	64
Oktok point - - - - -	477	Padada point - - - - -	706
Olango island - - - - -	404	— river, village - - - - -	695
Olanivan islet - - - - -	691	Padang bank - - - - -	235
Old Castle point - - - - -	84	— point - - - - -	504, 602
Olutanga island - - - - -	654	Padugan islet - - - - -	651
— to Tikauan		Paet point - - - - -	700
— point, coast	654	Pagadian anchorage - - - - -	674
Olutaya island - - - - -	355	— bay - - - - -	673
Omadal islet, shoals off - - -	214	— village - - - - -	674
Omapui islet - - - - -	182	Pagalad, town - - - - -	340
Omon point - - - - -	477	Pagalak, town - - - - -	340
Onate rock - - - - -	419	Pagapas bay - - - - -	298
Oom river - - - - -	619	Pagassan island, dangers - - -	138
Oot point - - - - -	514	Pagbabaugnan point - - - - -	460
Opol bay, anchorage, town - - -	438	Pagbilao bay, buoy, directions -	457
— point - - - - -	441	— Chica, island - - - - -	458
Opon light - - - - -	395	— church - - - - -	457
— tower - - - - -	391, 393	— Grande island - - - - -	458
— town - - - - -	391	Pagbokavan islet - - - - -	565
Oras bay, anchorage, directions	614	Pagbulungan point - - - - -	345
— river, town - - - - -	614	Pagoda cliff - - - - -	110
Ordenez bank - - - - -	495	Pagonarong island - - - - -	505
Origon islet - - - - -	320	Pagsanhan point, river, valley -	465
—, reef W. of, clear-		—, reef south-	
— ing mark	320	— west of	465
Orista island - - - - -	543	Paitan bay - - - - -	160
Ormok anchorage - - - - -	414	— sungi - - - - -	163
— bay, anchorage - - - - -	413	Pajo river - - - - -	579
— light, town - - - - -	413	Pakabalo reef - - - - -	541
—, shoal - - - - -	389	Pakahan point - - - - -	602
—, telegraph cable, tide - - -	414	Pakalangan - - - - -	216
— to Baybay, coast - - - - -	414	Pakia island - - - - -	268
Orok, mount - - - - -	365	Pakiputan strait, anchorage -	702
Oroquieta, anchorage off - - -	445	—, dangers - - - - -	702
— river, town - - - - -	445	—, clear-	
Oslob point, anchorage - - - -	402	— ing marks	702
— to Tañon point, coast	402	—, directions	
—, telegraph station, cable -	402	—	702, 703
— town - - - - -	402	—, tidal streams	702
Osteng shoal - - - - -	394	Paknam shoal - - - - -	163
Oteiza village - - - - -	638	Pala point - - - - -	462
Oton bank, buoys - - - - -	327	Palad bank - - - - -	474
— dome - - - - -	327	Palag bay, anchorage - - - -	589
— town - - - - -	326	Palak, dry dock - - - - -	681, 722
Outer Lataan patch - - - - -	136	— harbour - - - - -	680
— patch, San Antonio bay	109	—, anchorages - - - - -	681
— shoal, N.W. Borneo		—, light - - - - -	680
— dangers	151	—, tidal streams - - - - -	682
Overton, Camp - - - - -	439	—, tides, winds - - - - -	681
		— island - - - - -	681
		—, tides - - - - -	681
		— town, anchorage off - - -	681

	Page		Page
Palalagoya point - - -	441	Palompon town, supplies, water	499
Palan point - - -	617	Paluan bay - - -	36
Palanan bay, anchorage - - -	535	_____, anchorage - - -	37
_____, point - - -	534, 535	_____, caution - - -	37
_____, river - - -	535	_____, dangers - - -	36, 37
Palanit river - - -	518	_____, tide, water - - -	37
Palanog port, buoys, depths -	493	_____, church, town - - -	37
_____, directions - - -	493	Palumbanes islands - - -	575
_____, light - - -	493	_____, dangers off	
_____, signal and		575, 576	
_____, telegraph station	493	Palumbato islet - - -	552
_____, tides - - -	494	_____, point - - -	493
_____, town - - -	494	Palundangan islet - - -	204
Palapag channel - - -	604	Pamaaun reef - - -	376
_____, mount - - -	607	Pamagbaran rock - - -	279
_____, port - - -	606	Pamakalan rock - - -	279
_____, anchorage - - -	606	Pamalikan island - - -	65
_____, directions - - -	606	Pamandian river - - -	657
_____, light - - -	605	Pamatusin cove, anchorage -	37
_____, tides - - -	607	Pambuan, point - - -	557
_____, water - - -	606	Pambuhan town, Samar N. coast	514
Palapay river - - -	500	_____, village, Samar E.	
Palasan island - - -	541	coast	623
Palaui island - - -	530	Pamelukan bank - - -	248
Paláwan island - - -	79	Pamilakan island - - -	406
_____, E. coast, cur-		Paminuitan hill - - -	406
rents, tides	80	Pamitinan islet - - -	69
_____, gene-		Pampanga rocks - - -	381
ral remarks	79	Pamuntangan point - - -	470
_____, mountains	96,	_____, to Suban	
99, 108,	110	point, coast	471
_____, north end -	81	_____, reef, buoy - - -	522
_____, products - - -	79	Pan de Azucar islands, shoals	
_____, south-east coast,		eastward of	361
caution	110	Panabulan islet - - -	650
_____,		Panabutan bay, light - - -	453
off-lying island and dangers	111	_____, point - - -	453
Pali island, anchorage off -	87	Panadlihan point - - -	623
_____, shoals E. and S. of	87	Panaga, mount - - -	668
_____, tides, water - - -	88	Panagahan - - -	250
Palihon islet - - -	515	Panagan river - - -	662
Palilan river - - -	444	Panagatan reef - - -	46
Palita island - - -	550	Panagtaran point - - -	99
Pallas river - - -	218	Panal reef - - -	370
Palliagan islands - - -	263	Panaldan river - - -	670, 671
Palma river, rock off - - -	325	Panalingahan peak - - -	110
Palmas island, anchorage, tidal		Panalsagon point - - -	369
streams	712	_____, to N. extreme	
Palo reef - - -	630	of Negros, coast	370
_____, river, town - - -	630	Panalsalon reef - - -	376
Palompon port - - -	499	Panampanang islet - - -	283
_____, coast, southward of	499	Pananamitan point - - -	625
_____, directions - - -	499	Panagatan point - - -	540
_____, islands - - -	574	Panaon island, anchorage -	417

	Page		Page
Panaon island and Kamiguin,		Pandannan island, anchorage	- 283
current between	451	" " , tidal streams	278
strait - - - -	417	Pandanpandang, town - -	267
" " , reef off east en-		Pandaras, tanjong - - -	167
trance	418	" " to Sandakan	
" " , tidal streams	417	harbour, coast	169
Panay island - - - -	322	Pandarochan bay - - -	44
" " and Tablas, tidal		" " village - - -	40
streams between	356	Pandasan island, anchorage	- 711
" " , islands off E. coast	356	" " to Hijo river,	
" " , north and east		coast	711
coasts	350	Pandukan island - - -	292
" " , north coast, tidal		Panga Sinan province - -	3
streams off	63	Panganaa islet, dangers off	- 260
" " , north-east point,		Pangandauan island - - -	60
tidal streams	357	Pangangan island - - -	405
" " , south coast -	326	Panganiran bay - - -	481
" " , south-east coast	363	" " point - - -	475
" " , tidal streams north		Pangao point - - -	548, 549
of	356	Pangapusan islet - - -	470
" " , west coast - -	323	Pangasahan point - - -	250
" " , Katanduanes		Pangasinan island - - -	263
island	581	" " point - - -	710
" shoal - - - -	59	" " , shoals off -	711
Pandalusan island - - -	655	" " to Gill point,	
" " , shoals		coast	711
southward of	659	Pangatatan islet - - -	70
Pandami island, village,		Pangbaganan river - - -	414
anchorage off	273	Panglao and Sikihor, tidal	
Pandan bay, Katanduanes	- 574	" " streams between	387
" " , directions - -	575	" " island - - -	406
" " , shoal in entrance	575	Pangan islet - - -	185
" " , Mindoro, anchorage	38	Panguil bay - - -	440
" " , Panay, anchorage	323	Panguilinan shoals - - -	441
" " , Sanga Sanga -	287	Pangutarang group, island	- 291
" " hill - - - -	328	" " , currents -	292
" " islands, Mindoro -	38	" " , islands N.E. of,	
" " islet, Cuyos - - -	67	caution, tidal streams	292
" " point, Katanduanes	574	" " passage - - -	293
" " , Leite - - -	636	Panhapuyan island - - -	243
" " , Mindoro - - -	315	Paniginhan river - - -	587
" " , Negros - - -	331, 372	Paniki islands - - -	565
" " , telegraph		" " point, Marinduque	- 469
station	372	" " , Masbate - - -	494
" " to Sohoton point,		Panikian island, Galera port	- 306
coast	372	" " , Mindanao,	
" " reef, clearing marks	- 664	S. coast	669
" " town - - - -	575	Paniman village - - -	572
Pandannan island, Paláwan,		Paninihian point - - -	617
" " water	113	Panirugan point - - -	630
" " , Sulu		" " , light - - -	631
archipelago	276	" " , shoal eastward	
		of, buoys	631

	Page		Page
Panjumajan island - - -	279	Pasihan island - - -	411
Panlatuan point - - -	482	Pasil point - - -	378
——— port - - -	482	——— shoal, buoy - - -	441
———, depths - - -	483	Passage reef - - -	158
Pansipit river - - -	299	——— westward of Linapakan	61
Pantao, anchorage; town	476	Passages, America to Philippines	23
———, shoal off - - -	476	———, China sea to Australia,	
Panto Panto point - - -	202	E. coast	24
Pantokomi point, reef - -	36	——— Port	
Pantokunan island - - -	264	Darwin	25
Panubigan islands - - -	646	———	
Panubulon islet, shoal south-		Torres strait	24, 25
ward of	330	———, Cuyos islands, west-	
Panusuhan island - - -	248	ward of	25
Papahag island - - -	286	———, Europe to Manila -	22
Papat, tanjong - - -	170	———, Manila to Europe	21, 22
Paquita islet - - -	553	——— Iloilo -	26
Paragua channel - - -	283	——— Saigon -	26
——— island - - -	79	——— Sebu -	26
Parakale bay, anchorage -	555	———, Philippines to America	22
——— reef - - -	555	———, Saigon to Manila -	27
——— river - - -	555	———, Singapore to the	
Parang, Mindanao, anchorage		Moluccas	27
———, light, town - - -	681	———, Sulu sea, through -	26
———, telegraph cable - -	681	———, Verde island passage -	25
——— Parang anchorage -	680	Pata island - - -	267
——— village, Sulu, anchorage		——— point, light - - -	528
off	264	——— to C. Engaño, coast	528
Parangaan islet - - -	274	Pataluan point - - -	262
Parasan harbour, anchorage	524	Patan point - - -	656
——— island - - -	524	——— to Tikauan point,	
——— village - - -	524	coast	657
Paris, village - - -	561	Patanongan island - - -	541
Parol island - - -	257	Patanunam island - - -	138
Paron point - - -	600	Patapat mountains - - -	527
Pasahan river - - -	249	Patawan islet, anchorage,	
Pasakao anchorage - - -	476	directions	115
———, tide - - -	477	Patayan island - - -	457
——— to Galvaney		Patent slips - - -	722
point, coast	477	Patian island - - -	266
———, telegraph station, cable	477	Patikolo village - - -	260
Pasalat reef - - -	208	Patongong islet, dangers -	114
Pasco channel - - -	95	Patoyas island - - -	60
———, current - - -	96	Patuko port - - -	690
——— point - - -	96	Patunga islet - - -	69
Pasegan island - - -	278	Patyakan point - - -	636
——— Guimba island - -	278	Pauay point - - -	378
Pasig - - -	4	Paya island, Dumankilas bay	666
——— islet - - -	613	——— islet, Cuyos - - -	69
——— rock, Alabat island	546	——— rock - - -	69
——— shoal - - -	96	Payne rock - - -	184
Pasigahon point - - -	409	Paypayan bay, anchorage	446
		Pearl bank - - -	295
		———, anchorage, tides	296

	Page		Page
Pechili reef - - -	578	Piakan point - - -	453
Peel, mount - - -	96	Piapi, mount, reef - - -	694
Pegasus reef - - -	175	----- to Davao river,	
Pelanduk rock - - -	236	coast	695
Pelotes rocks - - -	421	Piedra Blanca, rock - - -	54
Peña Plata village - - -	700	----- Rosario, rock - - -	330
Peñascales point - - -	421	Piedras point - - -	480
Penuntignan point - - -	601	Pig point - - -	471
Pepitas rocks - - -	364	Pilar bay, Panay - - -	355
Perak, pulo, and coast east-		----- islet - - -	497
ward	150	-----, port, Luzon, S. coast - - -	482
Perawan, tanjong - - -	148	-----, Siargao, anchorage - - -	428
----- and Benkoka		----- rocks - - -	501
river, flat between	148	----- town, anchorage off, Ponson	
Peris bay, anchorage - - -	475	island	412
Perseus bank - - -	342	Pilas channel - - -	253
Pescador islet - - -	386	-----, tidal streams - - -	254
Petisa point - - -	544	----- island, anchorage - - -	253
Petley point - - -	259	-----, coral patches off	
Petrel rock - - -	152	south point	253
-----, patch east of, beacon	152	Pili, town - - -	364
Phantom island - - -	60	Pilis bay - - -	593
Philippine islands - - -	1	Pilot bank - - -	230
-----, buoyage,		-----, mount - - -	351
uniform system of	28	Pilots, Agusan river - - -	432
-----, capital - - -	3	-----, Daet river - - -	556
-----, climate - - -	4	-----, Guiuan - - -	628
-----, coal - - -	3	-----, Guntuan passage,	
-----, commerce - - -	27	Surigao strait	429
-----, communi-		-----, Hinamok island - - -	632
cation	21	-----, Iloilo - - -	334
-----, earthquakes - - -	3	-----, Kananai island - - -	632, 634
----- extent - - -	2	-----, Kanimo pass - - -	558
-----, gales of the	17	-----, Nueva Caceres - - -	558
-----, inhabitants - - -	2	-----, Rio Grande de Kagayan	529
-----, navigation - - -	4	-----, San Juanico strait - - -	632, 634
-----, port		-----, Sebu port - - -	395
regulations	5	-----, Taft - - -	615
-----, products - - -	3	-----, Takloban - - -	632
-----, railways - - -	4	Pimalayan river, anchorage off	313
-----, shipping - - -	28	----- town - - -	313
-----, signals,		Piña island - - -	349
distress	5	Pinachiuyan island - - -	82
-----, storm - - -	6	Pinamalayan village - - -	81
-----, telegraphs	4	Pinamukan point and Bauan,	
-----, tides - - -	20, 715	anchorage between	300
-----, time and		Pinamungajan town,	
height of high water		anchorage off	385
at various ports, tables		Pinamuntangan bay, point - - -	464
for finding - - -	716-721	Pinandungan point - - -	551
-----, typhoons - - -	3	----- to Daet	
		river, coast	554
		Pinatayan shoal, buoy - - -	678

	Page		Page
Pindilin point - - -	615	Polillo rock - - -	100
Pineda shoal - - -	343	—— strait - - -	535
Pinnacle rock - - -	51	—— town - - -	541
Pinohagan island - - -	586	Pollok harbour, <i>see</i> Palak.	
Pintada islet - - -	282	Polo bay, anchorage - - -	446
Pirara point - - -	355	—— point, light - - -	446
Piratas rocks - - -	667	Pom pom, pulo - - -	205
Pirate head - - -	88	Pomelean islet - - -	278
—— island, dangers - - -	109	Pomelikan island - - -	78
—— point and coast south-		Pondanan island, shoal north of	584
ward	146	Pongka bay - - -	659
Pisan island - - -	670	Ponson island - - -	412
—— point - - -	671	Ponte bank - - -	346
Piso point - - -	710	Pontevedra town, shoal water	
——, harbour north of -	710	west of	373
—— reef - - -	710	Pontingbalas point - - -	328
—— river - - -	710	Pontud bank - - -	351
Pitas village - - -	148	—— island - - -	432
Pitogo, anchorage, Luzon,		Popototan island - - -	52
S. coast	460	Poro island, Kamotes - - -	411
—— bay, Luzon, S.E. coast,		——, Katanduanes - - -	584
anchorage, tide	573	—— islet, Biliran strait - - -	502
——, Sulu - - -	267	—— shoal - - -	411
—— island - - -	573	—— village, anchorage off -	411
—— town, shoal off - - -	460	Porongpong island - - -	575
——, reef south of - - -	460	Port regulations, Philippine	
Piton, mount - - -	201	islands	5
Placer, town, Masbate - - -	349	Porvenir village - - -	482
——, Mindanao - - -	636	Potol point - - -	323, 350
Plus islet, caution - - -	282	—— to Bulakau point,	
Pobre islet - - -	348	coast	350
Pöck, mount - - -	218	Pou rock - - -	624
Pocket bay, anchorage - - -	570	Powell rock - - -	149
Pohun point - - -	700	Power spit - - -	197
Point peak, bay westward of,		Prahu point, settlement at -	107
dangers	86	Prescott point - - -	230
Pola point, coast south-east of	687	President shoal - - -	245
Polak bay, anchorage, town -	312	Princesa point - - -	101
—— to Dumali point, coast	312	——, puerto - - -	99
Polalan bay - - -	586	——, anchorage - - -	101
Polarikan, settlement, water -	84	——, aspect - - -	99
Poliki bay - - -	600	——, coral spits,	
—— reef - - -	599	clearing marks	99
Polillo harbour, anchorage,		——, dangers - - -	100
directions	541	——, depths, entrance	99
—— island - - -	539	——, directions - - -	101
——, coal - - -	3	——, inlets - - -	100
——, E. side, islands		——, light - - -	100
and shoals off	541	——, supplies, water -	102
——, S. point, shoal off	539	——, tides, town -	101
——, W. side, shoals -	540	—— to Bivouac point,	
—— point, reef off -	539, 540	coast	102

	Page		Page
Principe Alfonso, puerto del	- 119	Putri, mount	- - - 213
Prueba bank	- - - 340	Pyramid hill	- - - 202
— rock	- - - 539		
Pu lute range	- - - 105	Queen of the Sea, bank	- - 70
Puan, pulo, Borneo	- - - 207	Quesada reef	- - - 73
Pucio point	- - - 323	Quoin hill, Labuk bay	- - 167
— to Jinalinan, coast	323	—, Sibuko bay	- - 213
Pudsey reefs	- - - 211		
— Dawson dangers	- - 155		
—, shoal			
— patches northward of	155	Rabin point	- - - 497
Puercos island	- - - 507	— to Matung point,	
Puerto point	- - - 531	— coast	498
Puertovillo point	- - - 412	Ragay bay, anchorage	- - 477
Pugut point	- - - 262	— gulf of	- - - 473
Pujada bay	- - - 641	—, east shore	- - 475
—, dangers, light	- 642	—, tides and tidal	
—, tides	- - 643	— streams	478
— to C. San Agustin,		—, west shore	- 475
— coast	643	—, anchorage	474
— island	- - - 641	—, telegraph station, town	477
Puju bank	- - - 253	Ragged hill	- - - 174
Pulanauta point, anchorage	- 346	Raha point, reef	- - - 131
Pulandaga bay	- - - 555	Railways, Philippine islands	- 4
— point	- - - 555	Rainy seasons	- - - 12
Pulanduta point	- - - 346	Ramesamei island	- - - 98
Puling island, reef west of	- 571	Ramon shoal	- - - 70
Pulo river, village	- - - 543	Ramos island	- - - 116
Pulupandan, town	- - - 372	Rapurapu island, light	- - 591
Pulupari island, danger off	- 549	— strait	- - - 595
Pumpungan village	- - - 414	—, beacons, buoys,	
Punas point	- - - 303	— dangers	595
—, tidal streams	- 63	—, directions	- 596
Pundagnitan anchorage	- - 706	— town, reef off	- - 591
Punubulu islet, shoals off	- 631	Raquit island	- - - 88
Punungan island	- - - 270	Rasa island, Naranjos group	- 505
— town	- - - 265	—, Palawan, shoal	
Pura-pura, pulo	- - - 167	— north of	103
Purdie patches	- - - 183	—, shoals and depths	
Puro island, Masbate	- - 345	— off	104
Puro islets, Tikao	- - - 487	— islet, Surigao strait	- - 420
Purog bay	- - - 580	—, light	- - - 421
Pusan point	- - - 640	—, reef westward of	- 421
—, current	- 640, 644	— point	- - - 602
Pusgo point	- - - 474	— to Padang point,	
— port, shoal in entrance	- 474	— coast	602
Putad, bank off	- - - 384	Rashleigh reef	- - - 212
Putiao port, tides	- - - 482	Raso islet	- - - 631
— river	- - - 482	Raton island	- - - 628
Putik islet	- - - 67	Rawnsley point	- - - 110
— point	- - - 265	— to C. Buliluyan	110
Putili islet	- - - 666	Ray bank	- - - 126
Putting-Buhangin shoals	- - 461		

	Page		Page
Sagausauan point - - -	494	Samar island, north-west coast,	
Sagay point - - -	369	anchorage	509
town, anchorage off -	436	_____ , south coast -	626
Sagayaran island, anchorage -	672	_____ , west coast -	518
_____, reefs north-		_____ rock - - -	244
east of	672, 673	Samarang point, cay off -	132
Sagurun, mount - - -	478, 481	Sambabuas islets, rock off -	497
Sail rock, Busuanga - - -	48	Samban well - - -	486
_____, Palumbanes - - -	576	Samboan town - - -	386
_____, rock south-south-west		Samboanga - - -	239
of	576	_____, anchorage -	240
Saima point - - -	230	_____, coal, communication	241
_____, boundary beacon		_____, dry dock -	241, 722
S.E. of	234	_____, supplies, water -	241
St. John point, reef off -	107	_____, telegraphs -	241
— Michael islands - - -	74	_____, tides - - -	242
— Nicholas, settlement -	59	_____ to Port Masinglok,	
Sakamalig bay - - -	608	coast	242
Sakar island - - -	192	_____, winds - - -	242
_____, beacons - - -	192	Samboanguita point, anchorage	374
_____, boat channel west		_____ town - - -	375
of	193	Sambulauan hill - - -	671
_____, islets south of -	194	_____ port - - -	671
_____ reef, clearing		Sampanmangio point - - -	142
mark	192	Sampinitan creek - - -	681
Sakol hill - - -	243	Samputan island - - -	506
_____ island, shoals off -	243	Samson patches - - -	136
_____ islands - - -	243	Samur island - - -	552
Sal islets - - -	364	San Agustin, cape - - -	643, 704
Salakan islet - - -	207	_____, current off	712
Salamanca, town - - -	377	_____, reef S.S.W.	
Salauang point - - -	679	of	643, 705
Salcedo, town - - -	628	_____ to Kaganuhan	
Saley point, water north of -	543	point, coast	705
Saligit, mount - - -	365	— Andres island, Naranjos -	505
Salimbubuk islet - - -	61	_____ islets, Marinduque -	469
Salingsingan island - - -	127	_____ point - - -	465
Salobot islet - - -	565	— Angel bay - - -	549
Salomague island - - -	468	— Antonio bay - - -	108
_____ point - - -	468	_____, anchorage -	109
_____ to Suban		_____, caution -	110
point, coast	469	_____, depths off -	109
Salupin island - - -	254	_____, directions -	109
Salvaria, islet - - -	470	_____, islets and	
Samal island, anchorages -	700	dangers	109
Samales group - - -	255	_____, mount - - -	465
Samanput island - - -	287	_____ point - - -	488
Samar island - - -	507	_____ , Samar, telegraph	
_____, east coast -	607	cable	632
_____, north coast -	509	— Bernardino islets -	507, 602
_____ ,		_____, light	507, 603
off-lying shoals	513	_____, tides -	517
_____ , north-east coast -	604	_____ strait - - -	503
_____ , north-west coast -	508		

	Page
San Bernardino strait, directions	517, 603
-----, tidal streams	516
--- Carlos, town - - -	377
--- Cosme point - - -	488
--- Diego island - - -	484
----- point - - -	30
--- Fernando, town, Sebu	400
-----, Sibuyan	340
-----, Tikao	489
--- Francisco, town - - -	411
--- Ildefonso, cape - - -	536
--- Isidro bay, town - - -	498
--- Jacinto, port - - -	488
-----, anchorage, light	488
-----, tides, water - - -	489
--- Joaquin river - - -	630
-----, town - - -	326
--- José de Buenavista,	
anchorage, town	325
-----,	
communication	325
-----,	
dangers	325
-----,	
telegraph cable	325
--- Lagonoy, town - - -	589
--- municipality, Mindoro	40
--- José point, Tikao, light	488
--- Juan de Bokbok, town	456
--- Ilos, anchorage,	
town	373
----- island - - -	510
--- Pamplona river - - -	528
--- Juanico strait - - -	633
-----, dangers,	
beacons, buoys	633, 634
-----, light - - -	631
-----, pilots - - -	632, 634
-----, southern	
entrance	633
-----, tidal	
streams	633
-----, tides - - -	633, 635
--- Julian, town - - -	617
--- Martin point - - -	317
--- Mateo, anchorage, town	239
--- Miguel bay, depths - - -	558
-----, directions - - -	563
-----, eastern side,	
dangers	561
-----, southern side - - -	559

	Page
San Miguel bay, western side	558, 559
----- island, S. Miguel	
bay, anchorages	562
-----, to Look river	
coast	562
-----, Tabako bay - - -	592
-----, Tikao, light	488
-----, reef eastward	
of	488
----- point, Samar - - -	621
-----, Tabako bay - - -	592
----- port - - -	487
--- Narciso, town - - -	474
--- Nicolas church, Sebu, light	395
--- Pascual fort - - -	479
--- Pedriño point - - -	298
--- Pedro bay - - -	630
-----, anchorage - - -	633
-----, buoys - - -	631
-----, directions - - -	632, 633
-----, islands and reefs	
630, 631	
----- fort, Iloilo - - -	333
-----, Sebu - - -	397
-----, light - - -	395
----- point, Romblon - - -	339
-----, town, Panay - - -	325
--- Policarpo bay - - -	613
--- Rafael bay, anchorage off	248
----- island - - -	542
----- point - - -	487, 489
--- Ramon bay, anchorage	611
----- village - - -	611
--- Remigio, town - - -	384
--- Ricardo, town - - -	630
--- Vicente bastion, Lubang	
island	33
----- bay, Luzon,	
anchorage	564
----- island - - -	531
----- port, Luzon - - -	530, 531
-----, anchorage, inner	531
-----, outer	532
-----, channel - - -	531
-----, dangers, buoy	531
-----, directions - - -	532
-----, light - - -	531
-----, tides and tidal	
streams	532

	Page
San Vicente to Escarpada	
point, coast	533
village, Mindanao,	
anchorage for	445
, Samar	616
Sand cay, Great Danger bank	126
, Sibuguey bay	659
cays, Banguuey South	
channel	151
off High point,	
Paláwan	93
, Mallawallé island,	
near	153
island, dangers	103
point	557
Sandakan harbour, aspect	169
, anchorage	170
, bar	170
, dangers	170
, directions	170,
172, 173	
to Dent haven,	
coast	174
to Tambisan	
island, tidal streams	176
, coal, wharf	172
, communication	171
, foreign consuls	171
, harbour dues	171
light	172
, hospital	171
, meteorological	table 713
, pier	171
, port limits	172
, repairs, trade	172
, supplies, water	172
, telegraph	171
, tide signals	172
, tides and tidal	
streams	172
, town	171
, weather	172, 713
Sandilands rock	143
, light	144
Sandoval point	462
Sandugan point, tidal streams	408
Sandy island, Borneo	161
, beacon	162
, coral patches off	162
, Sulu sea	72
point	537
Sang, town	267
Sanga Sanga island	285
Sangay point, town	590

	Page
Sangboy group, bank	252
islands, shoals off	252
Sangirin bay, anchorage	546
, directions	546
point, village	546
Sanguisiapo bank, anchorage	288
island, dangers	285
Sanko point	638
to Katarman point,	
coast	639
Sankol point	640
Santa Ana bay, anchorage, tides	329
Cruz bank	244
harbour	466
, anchorage	466
, directions	467
, light	466
, tides	467
island, Basilan strait	244
, Marinduque	466
, Little, island	244
point, Davao gulf	696
, anchorage off	697
, landmarks	697
, light	697
, Marinduque	465
, foul ground	
east of	466
, Paláwan,	
coast south of	86
to Dampier	
point, coast	86
river	466
town, communication	467
village, Mindanao	697
Elena, tides	633
Fe, town, Panay	323
, village, Bantayan	381
Filomena shoals	70
Maria, port, water	452
Monica, settlement	80
, rock awash off	80
Rita island, tides	635
pass, tide-rips in	634
, rock, beacon	634
Teresa hill, village	44
Santander village	402
Santiago, cape, light, semaphore,	
telegraph station	31, 298
Santo Nino bay, town	497
Saong bay	662
Saonlok bay	610

	Page		Page
Sapa Gaya bay - - -	169	Sebu, port, quarantine station -	394
Sapao port - - -	428	———, repairs - - -	398
Saparoak point - - -	130	———, shipping, supplies -	397
Sapenitan bay, anchorage -	663	———, southern approach -	393
——— point - - -	663	———, telegraph cables -	398
Sapian bay, peninsula - -	353	———, tides and tidal	
Saranga, pulo, reef off - -	197	———, streams	398
Sarangani bay - - -	688	———, time signal - - -	7
——— island - - -	690	———, trade, wharves -	397
——— islands - - -	690	———, typhoon signals -	398
———, tidal streams	690	———, vice-consul - - -	397
Sarap point - - -	108	———, telegraph station -	397
——— to Deception point,		——— town - - -	396, 397
coast	110	Sebu sea, currents - - -	410
Sardine reef - - -	42	Seco bank - - -	342
Sarmiente point - - -	119	—— islet - - -	324
Saro point - - -	653	Second point - - -	142
Sarraceno bank - - -	46	Sedam island - - -	232
Sarva point - - -	659	Segama river - - -	175
Sasa islet - - -	283	———, bar - - -	176
Satan's rock - - -	420	Segannen and Silibukan rivers	191
Satiold islet, shoals off -	252	———, communication	191
Schuck reef - - -	156	———, to Lahat Datu, coast	191
Seasons, rainy - - -	12	——— river, clearing mark	
Sebaste village, shoal west of	323	——— for spit off entrance	190
Seboto point - - -	654	——— tobacco estate - - -	191
Sebu island, coal - - -	382	Segyam islands - - -	107
——— and Bohol, currents		———, anchorage,	
between	410	dangers	108
———, east coast - - -	387	——— to Sarap point,	
———, north coast - - -	383	coast	108
———, south-east coast -	399	Sekam island, anchorage -	116
———, tidal streams	387	———, tides and tidal	
———, west coast - - -	382	streams	117
———, port - - -	392	Sekubun island - - -	283
———, channel, depths -	393	Selun island - - -	273
———, coal - - -	397	———, bank north-east of	269
———, communication -	398	Selungan point, anchorage	
———, dangers, N.E.		west of	676
approach, buoys	393	Semaruga point - - -	675
———, dangers, southern		Semawang, tadjong - - -	168
approach, buoys	394	Semirara island, coal - -	316
———, directions - - -	396	——— islands - - -	316
———, from		———, town - - -	316
Hintotolo channel	399	Senelak island - - -	236
———, lights - - -	394, 395	Sentry bank, currents - -	177
———, patent slip - - -	398, 722	———, tidal streams -	178
———, pilots - - -	395	Separation point - - -	105
———, quarantine anchorage	395	——— port, directions -	106
———, buoys	396	Sepok point - - -	301
		Serantes shoal - - -	267

	Page		Page
Serudong river, navigability	- 232	Sibetik island, coal -	- 232
———, directions -	- 232	———, coal depot -	- 231
Shadwell islet, dangers off	- 86	———, to the	
Shark's Fin bay -	- 81	———, southward	232
———, dangers -	- 82	———, coaling pier -	231
——— range -	- 84	———, communication	232
Sharp peak, Luzon -	- 602	———, directions to	231
———, Mindanao -	- 648	———, port charges	232
———, Paláwan -	- 81	———, tides,	
——— point -	- 591	———, tidal streams	232
——— Shoulder, mountain	- 84	———, dangers -	235
Shell island, dangers off	- 94	———, tidal streams	
Sheppard reef -	- 212	———, east of	228
Shipping, Philippine islands	- 28	Sibolon island -	- 316
Shoal point -	- 190	Sibonga, anchorage, telegraph	
Si Amil island -	- 220	——— station, Sebu	400
— ba ung reef -	- 165	———, port, Bukas islands	- 426
Siagut point, dangers off	- 129	Sibono point, anchorage	
———, bay south-westward		——— north of	476
——— of	129	Sibuan islet -	- 208
——— shoal -	- 129	Sibuguey bay, depths -	- 645
Sialat point, light -	- 577	———, eastern side -	654
Siargas island -	- 427	———, off-lying shoals	
Siaasi, anchorage, directions	- 271	——— 658, 659	
———, northern entrance, east		———, west shore -	- 645
——— side	270	——— islet -	- 496
———, west		———, mount, coal deposit	657
——— side	271	——— river -	- 657
———, southern entrance -	- 271	Sibukin point -	- 455
———, supplies, tides, tidal		Sibuko bay, Borneo -	- 212
——— streams	272	———, coastmarks -	- 213
———, telegraph cable, tidal		———, off-lying islets and	
——— signals	272	——— dangers	219
———, telegraph station, town	272	———, topography -	- 212
——— island, dangers -	- 268	———, Mindanao -	- 453
———, shoals northward of	269	———, anchorage -	- 454
Siaton point -	- 374	——— to Samboanga, coast	454
Siay river, directions -	- 657	——— river, bore -	- 236
Sibago island -	- 246	——— town, supplies -	- 454
Sibahong river -	- 199	Sibulan island -	- 661
Sibakies river -	- 237	——— port -	- 660
Sibala, mount -	- 355	———, dangers -	- 664
Sibalatan point, shoal off	- 693	———, directions -	- 664
Sibale island -	- 420	———, north-east side	- 663
Sibalok island -	- 282	———, south-west side	- 661
Sibalon river -	- 325	——— reef -	- 664
Sibanok island -	- 420	Sibutu island -	- 181, 182
Sibarut bank -	- 256	———, channel west of,	
Sibaton island -	- 317	——— tidal streams	180, 183, 185
Sibauan island -	- 565	———, tides -	- 180, 185
Sibay island, Samar -	- 613	——— islands and reefs -	- 180
———, Semirara -	- 317		
Sibetik island -	- 229		
———, boundary beacons	234		

	Page		Page
Sibitu islands, channels - - -	181	Siit port - - - -	374
—— passage - - - -	180	Sikayak point - - - -	450
——, tidal streams	64, 180, 185	Sikihor and Panglao, tidal	
—— peak - - - -	181	streams between	387
Sibuyan island, mount - - -	339	—— island - - - -	408
—— and Masbate,		——, tidal streams -	408
channel between	342	——, town - - - -	409
——, directions	343	Sikogon bay - - - -	452
——, tidal streams	344	—— channel - - - -	360
——, east coast - - -	340	—— island - - - -	360
——, tidal streams	356	——, patch north of -	359
——, north-east reef -	341	—— point - - - -	452
——, south-west coast,		—— river - - - -	453
tidal streams	356	Sila island - - - -	505
Sidongal, mount - - - -	209	—— point - - - -	608
——, tanjong, shoal south-		——, dangers, clearing mark	609
west of, clearing mark	209	Silad bay, village - - -	498
Sierra Madre - - - -	29, 526	—— to Kanaguayan point,	
Siete Pecados islets, dangers,		coast	498
light	366	Silakay point - - - -	689
Sigaboy island - - - -	707	Silam harbour - - - -	194
—— village - - - -	707	——, anchorage - - -	197
Sigalong river - - - -	202	——, directions	198
—— trusan, channel,		——, tides, tidal streams	199
directions	210	——, islets and dangers	195
Sigarin point - - - -	692	——, north shore - -	195
Sigat point - - - -	351	——, mount - - - -	195
Sigayan bay, Luzon - - -	304	——, village - - - -	198, 199
——, Mindanao - - - -	675	——, position, supplies	199
—— point, Luzon - - -	304	Silanga bay, anchorage -	83
——, reef off, Mindanao	676	——, directions - - -	84
—— to Lapitan point,		—— island, Mindanao -	446
coast	676	—— islands, Palawan -	83
—— river - - - -	304	—— peak, settlement -	83
Sigboyé island, rock off -	275	Silangan, church, village -	547
—— passage, currents -	276	—— pass, danger - - -	547
Signal island - - - -	82	——, directions - 547,	548
——, dangers off - - -	82, 83	—— point, Sulu - - -	262
—— station, Palanog port -	493	Silangui islet - - - -	659
——, Taal - - - -	299	——, anchorage off - -	660
Signals, distress - - - -	5	Silankapo point - - - -	460
——, storm - - - -	6	Silapag passage, anchorage,	
——, Katbalogan - - -	523	tidal streams	214
——, tidal, Isabela, la -	250	Silat islet, Cuyos - - -	70
——, Siassi - - - -	272	——, Mindoro - - - -	316
——, time - - - -	7	Silay, town, anchorage off -	372
——, typhoon, Iloilo - -	334	Silibukan river - - - -	191
——, Sebu - - - -	398	Silimponon, coal mines, river -	233
		Silingaan island, cay and reef	
		off	166

	Page		Page
Silingan, mount - - -	- 652	Siparay islet - - -	- 69
—— point - - -	- 546	Sipayu island - - -	- 289
Silino island - - -	- 448	Sipindung, cay, dangers -	- 161
Silk island - - -	- 151	Sipit river - - -	- 202
——, cay north-east of -	- 158	——, depths - - -	- 203
——, reef, northward of -	- 158	Sipitong river - - -	- 8
—— to Sandakan harbour,		Sipungut channel - - -	- 281
coast	156	Sir James Brooke point, light	107
Silla, mount, point - - -	- 448	——, foul	
Silonay islet - - -	- 310	ground south-eastward of	108
—— river, village - - -	- 310	Siraguay river - - -	- 453
Siluag islet - - -	- 184	Siraoan river, village - -	- 698
Silumpat island - - -	- 204	Siruma bay, town - - -	- 561
Silungan islet - - -	- 218	—— island, point - - -	- 561
Simaddel island - - -	- 160	——, shoals off - - -	- 561
——, anchorage - - -	- 161	Sirun island - - -	- 273
——, dangers - 160,	161	Sisiran bay, anchorage, water	568
——, directions - - -	- 161	Skertchley, mount - - -	- 200
Simalak islands - - -	- 288	—— point - - -	- 200
Simaluk island - - -	- 275	—— to Sungi	
Simanahan channel - - -	- 125	Madai, coast	200
—— reef - - -	- 125	Slips, patent - - -	- 722
Simanale anchorage - - -	- 285	Smith island - - -	- 81
Simara island, anchorage -	- 319	—— point - - -	- 532
——, shoals off - - -	- 320	Snake rock - - -	- 85
Simatahan river - - -	- 233	Soai Soaiun bay - - -	- 195
——, directions - - -	- 234	Sobog bay - - -	- 583
Simengaris river - - -	- 237	Sogod bay - - -	- 416
Simio point - - -	- 445	——, town - - -	- 389
Simisa island - - -	- 257	—— Norte, town - - -	- 416
Simo banks - - -	- 32	—— Sur, town - - -	- 416
Simonor island - - -	- 284	Sogokan cove - - -	- 585
——, supplies - - -	- 288	Soguikay bay, island, water	- 315
Simporna, pier, settlement	- 215	Sohoton islet - - -	- 518
Sinagbuan islet - - -	- 282	—— point, Katanduanes -	- 583
Sinaktan point - - -	- 587	——, Negros - - -	- 373
Sinalog point - - -	- 587	——, Samar - - -	- 518
Sinalong, mount - - -	- 203	—— to Jibatan point	518
Sindangan bay, anchorage	- 450	Solatan island - - -	- 441
—— point - - -	- 450	Solitario islet, Luzon - -	- 481
Singag island - - -	- 638	——, Sulu sea - - -	- 61
Sino Solan river - - -	- 237	Solitary hill - - -	- 377
Sinonog island, shoal eastward		Solodon islet - - -	- 570
of	244	Sombokobon bay - - -	- 474
Sipadan islet - - -	- 223	Sombrero (Kabulauan) island	- 61
Sipak island - - -	- 257	—— (30th of June) island	103
Sipaka point - - -	- 434	—— islet, Luzon, E. coast	573
Sipalay, anchorage - - -	- 373	——, Marikaban - - -	- 301
—— bay - - -	- 374	——, Panay, E. coast	361
Sipalon island - - -	- 475	——, Ragay gulf - - -	- 478
Sipang islands - - -	- 295	—— rock - - -	- 70
Sipangas islet - - -	- 214	Sora cay - - -	- 609
Sipankot islet - - -	- 182		

	Page		Page
Sorsogon, port - - -	483	Squall point - - -	92
——, anchorage -	485	——, reefs and sand-	
——, depths -	483	banks off	93
——, directions -	485	Standard time, British North	
——, inner port -	484	Borneo	10
——, water -	485, 486	——, Philippine islands	7
—— province - - -	485	Stanlake island, patch east of	94
——, telegraph station, cable	485	Stavely, mount - - -	99
——, town, supplies -	485	Steep cliff - - -	105
Sostoa bank - - -	346	Steepfall range - - -	117
South Brother islet - - -	80	Stewart peaks - - -	200
—— channel dangers, Banguay,		Stone-fort (Kota Bato), town -	684
clearing marks	152	Stone point, islet and rocks off	235
—— Channel island - - -	91	Storm signals - - -	6
—— Gigante island, anchorage	358	Straggler, The, islet - - -	153
——, bank		—— reef - - -	154
south-east of	358	Sua bay, point - - -	629
—— Green island; anchorage		Suanbato point - - -	674
and reef southward of	95	—— to Kaliban	
—— harbour, Balambangan,		point, coast	674
directions, tides, water	131	Suang-bunah, town - - -	293
—— hill - - -	89	Suay, town - - -	372
—— islet - - -	571	Subaang bay, shoal in - - -	308
—— Mangsi island - - -	127	—— to Balete point,	
—— mount - - -	243	coast	308
—— Passage island - - -	85	——, town - - -	308
—— point, Burias island -	480	Suban point - - -	469
——, Guimaras island -	329	Subuan river, anchorage off -	676
——, Tablas island -	321	Subunguin point, reef north-	
—— rock - - -	81	west of	464
—— shoal, Lumbukan Danger		——, clearing marks	464
bank	124	Sugar Loaf, peak - - -	569
—— spit, P. Princesa, clearing		Sugot bay, anchorage - - -	599
mark	99	—— to Kaut point, coast	600
—— Taitai island - - -	86	Sugut bay, anchorage - - -	680
——, dangers off	87	——, cordillera de - - -	682
——, dangerous		Sujak point - - -	503
ground east of	87	Sukol river - - -	313
—— Tub Bataha reef - - -	73	Sula channel - - -	593
—— Ubian channel - - -	281	——, port - - -	597
—— island, tides -	277	——, light, water - - -	598
——, tidal streams		Sulade island, anchorage,	
south of	278	currents	264
South-east shoals, Great Danger		—— and Kakatuan,	
bank	126	tidal streams between	278
—— Banguay dangers -	141	Sulat bay, Samar, anchorage,	
South-west bank, St. Michael		directions	616
islands, anchorage	75	—— town - - -	616
——, dangers near -	75	Sulauang point - - -	438
—— bluff, Simaddel island	160	—— to Maputi point,	
South-western banks, Balábac -	118	coast	439
		Sultan bank - - -	66
		—— peak - - -	102

	Page		Page
Sultana bank - - -	71	Surigao, anchorage off - -	419
Sulu archipelago - - -	7, 246	, light, mails - - -	419
, products - - -	7	, province - - -	418
, tidal streams - - -	64	, river - - -	418
group - - -	257	, strait - - -	424
, population - - -	258	, Guntuan passage - -	429
island - - -	257	, tidal streams - - -	429
, climate - - -	258	, tide - - -	419
, islands north-west of -	263	, winds - - -	425
, south-west coast - -	264	, telegraph cable, tides,	
roadstead - - -	260	trade - - -	419
, anchorage - - -	261	town - - -	418
, tides, tidal		Surveys, want of - - -	1
streams - - -	261	Susan islet - - -	330
sea - - -	61	, rock awash north of -	331
, breakers reported - -	73	Suyak islet, cay N.N.E. of -	370
, currents - - -	19, 62	Swirl patch - - -	227
, tidal streams - - -	63		
, winds - - -	11, 62		
town - - -	261		
, coal - - -	262	Taal and Lemery, anchorage -	299
, imports and exports -	261	, towns - - -	299
, lights - - -	261	lake - - -	299
, shipping, supplies,		, light, signal station -	299
water - - -	262	Taankaan point - - -	416
, telegraph station,		Taba bay, dangers, depths -	656
cables - - -	261	, directions - - -	657
, wireless telegraph -	261	Tabago cove - - -	580
Suluan island - - -	422	Tabak rocks - - -	69
, anchorage - - -	423	Tabako bay - - -	593
, light - - -	422	, directions - - -	594
Sumabun, pulo - - -	197	, light - - -	594
Sumangul point - - -	661	, reef in - - -	593
Sumban point - - -	688	, tides - - -	594
Sumilon island, Sebu sea -	402	, western approach - -	593
, Surigao strait - - -	419	, telegraph station, town -	594
, currents near - - -	420	Tabago bay - - -	498
Sumlug point, reefs off - -	709	Tabauwan island, Darvel bay -	203
to Arena point,		, bay on S. side - - -	204
coast - - -	709, 710	, pulo, Silam harbour -	197
Sunbeam patch - - -	163	Tabawan island - - -	278
Sunday bank - - -	177	, anchorage,	
Sunga shoal - - -	256	supplies - - -	277
Sungi Gum-gum - - -	168	Tabgon anchorage - - -	571
Madai, depths - - -	201	, directions - - -	571
to Sigalong trusan,		, islands and	
coast - - -	201	dangers - - -	571
Paitan - - -	163	village - - -	572
point - - -	626	Tabignan point - - -	466, 467
Suok village - - -	260	Tablas and Romblon, tidal	
Suong islet - - -	656	streams between - - -	336
Suribao river, village - -	620	Sibuyan, tidal streams	
		between - - -	356

	Page		Page
Tablas and Simara, tidal streams		Tagubanhán island - - -	362
between	336	, anchorage off	363
, cabezo de - - -	320	, shoal south of	363
island - - -	320	Taguisan point - - -	660
shoal - - -	295	Taguite, bay, island, point	646
Table head, fresh water S.W. of	102	, mount - - -	646
mountain - - -	213	Tagulaya point - - -	697
Tabogon bay - - -	389	, shoals off - 697, 698	
Tabok island - - -	499	to Siraoan river,	
Tabonan point, anchorage	450	coast	698
Tabu point - - -	444	Tagum peaks - - -	468
to Balaríng point,		point - - -	468
coast	444	river, Marinduque -	466
Tabuan group - - -	278	, Mindanao - - -	703
island, patch westward		, anchorage off -	703
of	278	, shoal S.W. of -	704
Tabulunga island - - -	279	, tidal streams -	703
Tabunan point - - -	494	to Hijo river, coast	704
Tabusao island - - -	550	Tagun bay - - -	568
Taebun channel - - -	573	, anchorage - - -	569
Taft, town - - -	615	Taguntum bank - - -	578
, anchorage for - -	615	Tagusan point - - -	311
, directions, pilots -	615	Tagutu island - - -	253
Tagabas bay, anchorage, dangers	461	Tahidan point - - -	580
, directions - - -	462	Tahing Tahing village -	277
Tagabibi bay, anchorage -	706	Taig point - - -	616
Tagabua islet, anchorage, reefs		Taikéla island, shoals off	251
off	201	Tailon islet - - -	552
Tagabuli bay, anchorage -	696	Taitai - - -	47
Tagalinog island - - -	106	bay, fort - - -	84
Tagalo point, reefs - - -	673	anchorage, supplies,	
Tagampul islet - - -	501	tides	85
Taganak island, currents -	167	, islands and dangers	
patches - - -	167	85, 86	
Taganilao point - - -	641	, North, island - - -	86
Tagao shoals, dangers off -	276	, South, island - - -	86
Tagapula island - - -	496	Taja islet - - -	295
Tagassan bay, tides - - -	216	Tajao bank - - -	385
Tagauayan island - - -	69	point - - -	385
Tagbanao cove - - -	705	, tidal streams	64, 385, 387
, anchorage - - -	706	Tajud point - - -	311
Tagbilaran church - - -	406	Taka river, depth on bar -	149
strait, anchorage -	406	Takbolubo, anchorage -	107
, town - - -	407	, settlement, supplies,	
Tagdaranes islets - - -	520	water	107
Tagipil island - - -	163	Takbubuk islet - - -	69
Tagiran point - - -	487	Takligan point - - -	543
Tago island - - -	361	Takloban, anchorage, directions	632
, town - - -	638	, pilots - - -	632
Tagolo point, light - - -	448	, telegraph cable -	632
, tidal streams - - -	448	, tides - - -	632
Tagoloan town - - -	437	, town - - -	632
Tagonito point - - -	426	Taklogan bay - - -	488
Taguan bay - - -	488		

	Page
Taktagan islet - - -	271
Taktak point - - -	518
Taku shoal - - -	494
Takubtakuban hill - - -	559
————, anchorage	
———— S. of	559
Takut Buansa, shoal - - -	262
———— Langon, shoal - - -	269
———— Mataha, island - - -	285
———— Pababat, bank - - -	255
———— Pabunuan bank - - -	253
———— Sungu, shoal, Samales	
———— group	256
————, Siassi - - -	269
Takutsuligan patch - - -	257
Talaban islet - - -	459
Talabasi point - - -	37
Talabe, town - - -	378
Talaga, village - - -	148
Talagios river - - -	365
Talaguilong, port - - -	449
Talahit island - - -	497
Talaid point - - -	655
———— to Kabog point,	
———— coast	656
Talaji, mount - - -	303
———— point - - -	303
Talamtan bank - - -	296
Talawangan point - - -	378
Taledom rock - - -	661
Talikud island - - -	701
Talin bay, point - - -	31
Talipanan point - - -	305
Talisai island - - -	510
———— point - - -	346
————, town, Sebu - - -	393
Talisay bay - - -	708
———— to Bilangan point,	
———— coast	709
———— reef - - -	708
———— river, valley - - -	465
————, town, Negros - - -	372
Talisaya point - - -	326
Talisayan, anchorage, town - - -	434
Talkauayan bay - - -	478
Talong islet - - -	411
Talugutan village - - -	691
Taluk island - - -	268
Talukluk channel, islet - - -	447
Tambagaan island, anchorage,	
———— dangers off	275
Tambalan point - - -	693

	Page
Tambang port - - -	564
Tamaron isle - - -	315
Tambatan point - - -	670
Tambiluanga island, water - - -	282
Tambisan island, peak - - -	176
————, tides - - -	176
———— to Dent haven,	
———— coast	178
————, tidal streams	176
Tambog point - - -	639
———— and Katarman	
———— point, port and reef between	639
Tamboloton bay - - -	321
Tambon island - - -	54
Tambulian island, Sulu,	
———— anchorage	267
———— islet, Mallawallé	
———— channel	157
———— point - - -	669
Tamila rock - - -	253
Tampatampa island - - -	282
Tampel island - - -	54
Tamuk island - - -	254
————, tidal streams	
———— south of	255
Tanao islet, shoal south-east of	552
———— islets - - -	551
———— pass - - -	553
————, directions - - -	554
Tanauan, town - - -	630
Tandag point, town - - -	637
———— to Umanun point,	
———— coast	638
Tandao bank - - -	346
Tandikan point - - -	267
Tando point, rock south of - - -	653
———— Bulong, trusan - - -	215
Tandog island, shoal off - - -	329
Tando-tao, tanjong - - -	77
Tandu point - - -	267
Tandubas island - - -	283
Tandubato island - - -	280
Tang point - - -	602
Tangad island - - -	521
———— Libukan island - - -	520
Tangao islet - - -	287
Tangat island - - -	55
Tangil point - - -	385
Tanglar island, point - - -	560
Tanguingui island, Burias - - -	478
————, rocky head	
———— N.N.E. of	479

	Page		Page
Tanguingui islet, Masbate, S.		Taris point - - -	587
_____ of, light	350	Taritipan, manganese mines	160
_____ , shoal south of	350	Tarlak reef - - -	545
Tangusu bay, rock in - -	176	Taruk island - - -	280
Tanj Bungan island, foul		Tataan, anchorage, directions	290
_____ ground	159	_____ islands, pass - -	288
Tankolaluan island - - -	276	_____ , settlement, supplies	290
Tankuiki rock - - -	267	_____ , tides - - -	290
Tanna Ballu, mount - - -	209	Tatagan island - - -	206
_____ , pulo - - -	204	Tatal rocks - - -	651
Tanoban point - - -	555	Tatalan island - - -	255
Tanobon island - - -	48	Tataupin point - - -	541
_____ , rock N.W. of	49	Tatus islet - - -	487
Tañon church, village - -	402	Tautitau islet - - -	263
_____ point - - -	387	Taukauan point - - -	641
_____ , anchorage - -	402	Tavo Tavo, tanjong - -	76
_____ strait - - -	376	Tawao, anchorage - - -	227
_____ , south entrance -	387	_____ , communication, trade	227
_____ , tidal streams	63	_____ , light, settlement -	227
	380, 387	_____ point, river - - -	227
Tantanang bay - - -	663	_____ , shoals off - - -	227, 228
_____ , anchorage - -	664	_____ , tides, tidal streams	228
_____ point, rocks off -	662	_____ to coal depôt, Sibetik	
Tantauayan hill - - -	373	_____ island, directions	231
Tanuan point - - -	477	_____ , from Friedrich haven	228, 229
Tapaan island - - -	273	Tawi Tawi bay - - -	283
_____ and Lapak, chan-		_____ group - - -	274
_____ nel between, directions	273	_____ , supplies - - -	278
_____ passage, tidal streams	273	_____ island - - -	279
_____ shoal - - -	274	_____ , channels E. of	281
Tapian, mount - - -	465	_____ , islands off E.	
_____ point, reef - - -	685	_____ coast	279
_____ to Kidipil point,		_____ , south of	283
_____ coast	685	_____ , islets and	
Tapiantana channel - - -	255	_____ dangers N.E. of	280
_____ group - - -	254	_____ , S. coast,	
_____ , depths be-		_____ anchorage	288
_____ tween	255	_____ , winds	
_____ island - - -	254	_____ and weather	288
_____ , tides - - -	255	_____ summit - - -	279
Tapilon point - - -	383	Tayabas bay - - -	455
Tapul bay, anchorage, direc-		_____ , anchorage, dangers	456
_____ tions	98	_____ , tidal streams - -	63
_____ group - - -	267,	_____ point, reef - - -	457
_____ , tidal streams -	267	_____ , province - - -	456
_____ island - - -	268	_____ river, light - - -	456
Tara island, Busuanga, reefs off	49	Tayan river - - -	408
_____ , Siassi - - -	269	Taynabo point, reef east of	653
Tara tara islet - - -	524	Tayoman point - - -	654
Taragnan Fronton, headland	519	Taytay point - - -	635
_____ , port - - -	519		
Tarahid point - - -	580		
Tarigtig point - - -	535		

	Page		Page
Tebeyu bay - - -	105	Telegraph stations:—	
Tegarangan river - - -	143	Abuyog - - -	635
Tegolting point - - -	663	Albay - - -	598
Teinga island, shoals off - - -	252	Aparri - - -	528
—— Laguit island - - -	251	Argao - - -	400
—— and Tein-		Bakolod - - -	372
golan, tidal streams between	251	Bakon - - -	600
Teingolan island - - -	251	Balamban - - -	385
Teipono island - - -	251	Balayan - - -	299
Telegraph cables:—		Bangui - - -	527
Argao - - -	400	Batangas - - -	300
Bakolod - - -	372	Binalbagan - - -	373
Bakon - - -	600	Boak - - -	471
Boak - - -	471	Dumaguete - - -	376
Camp Overton - - -	440	Dumanhug - - -	386
Dumaguete - - -	376	Guijulugan - - -	378
Guimaras island - - -	328	Guinayan - - -	475
Guinayan - - -	475	Himamailan - - -	373
Iligan - - -	439	Iligan - - -	439
Iloilo - - -	334	Isabela, la - - -	247
Kalapan - - -	309	Kagayan anchorage - - -	438
Kalbayok - - -	519	Kalbayok - - -	519
Kalolbong - - -	578	Kapiz - - -	354
Karigara - - -	503	Karigara - - -	503
Katbalogan - - -	523	Katbalogan - - -	523
Legaspi - - -	598	Legaspi - - -	598
Liguan - - -	597	Libog - - -	598
Liloan - - -	391	Liloan - - -	391
Loon - - -	405	Lintogo - - -	439
Makabalan point - - -	438	Loon - - -	405
Malabang - - -	679	Lucena - - -	456
Masbate - - -	494	Masbate - - -	494
Milagros - - -	347	Milagros - - -	347
Misamis - - -	443	Misamis - - -	443
Negros - - -	369	Oslob - - -	402
Nipa point - - -	355	Palanog, port, lighthouse - - -	493
Ormok - - -	413	Pandan point, Negros - - -	372
Oslob - - -	402	Pasakao - - -	477
Parang - - -	681	Ragay - - -	477
Pasakao - - -	477	Samboanga - - -	239
Romblon - - -	339	Santiago, cape, lighthouse 31, 298	
Samboanga - - -	241	Sebu, port - - -	397
San Antonio - - -	632	Siassi - - -	272
—— José de Buenavista - - -	325	Sibonga - - -	400
Sebu, port - - -	398	Sorsogon - - -	485
Siassi - - -	272	Sulu - - -	261
Sorsogon - - -	485	Takloban - - -	594
Sulu - - -	261	Takloban - - -	632
Surigao - - -	419	Telegraphs, British N Borneo 9	
Takloban - - -	632		
Telegraph point - - -	306		

Kudat 145

Lahat Datu 194

	Page		Page
Telegraphs, British N. Borneo,		Tidal streams:—	
Sandakan	171	Bitinan island	- 258
—, Philippine islands	- 4	Black rock channels	- 491
Telephone	- 4, 120, 194, 635	Bohol island, west coast	- 405
Teloh Sibet river	- 188	Bombonon point	- 387
Telok Bukan, tobacco estate	- 191	Bondog peninsula	- 63
Tembalan rock	- 236	— point	- 473
Temerario rock	- 73	Bongao island	- 287
Temontangis, mount	- 257	Borobodiangan point	- 509
Temple island	- 105	Borokay and Karabao,	
Templo islet	- 478	between	322
Ten-foot rock, Banguey, South		Bulakau point	- 63
channel	152	Bulalaki point	- 63
Tenga river, depths on bar	- 149	Cabra island and Lubang,	
Teomabal island, Pangutarang	- 292	between	32
—, bank and		Caldera point	- 454
danger north of	292	Coal Mine reach	- 232
—, Sulu	- 266	Cook channel	- 91
Teresa bank	- 578	Dalaguete point	- 387, 401
Tern rock	- 144	Darvel bay	- 187
Ternate island	- 505	—, north shore	- 179
Tetabuan, pulo	- 169	Dent haven	- 179
Tetian bay, anchorage	- 679	— to Tanjong	
Three-fathoms shoal, Taitai bay	86	Labian	179
Three-peaked hill, Sandakan	- 170	Dok Kan island	- 294, 295
Three peaks, mount, Poro island	411	Dumaguete point	- 387
Thumb hill, Tawi Tawi	- 285	Dumali point	- 63
— peak, Balambangan	- 129	English spit, southward of	- 228
—, Palawan	- 99	Escarceo point	- 63, 473
Thurston rock	- 553	Flecha point	- 669
Tiain point	- 690	Frances reef, near	- 186
Tibakkan, cay, dangers	- 157	Friedrich haven	- 226
Tibiao town, bank off	- 325	Gigantes islands	- 63
Tiblaun village	- 706	Golo island and Lubang, be-	
Tidal signals, Isabel, la	- 250	tween	35
—, Siassi	- 272	Grassy point	- 231
Tidal streams:—		Guimaras strait	- 332
Adolphy point	- 337	Guntuan passage	- 429
Alice channel	- 185	Hanabatas channel	- 634
Ambil island and Lubang		Homalig island	- 542
between	34	Iguana bank	- 366
Arena point	- 473	Illana bay	- 669, 677, 682
Balabac strait	- 124	Iloilo strait	- 63, 64, 335
Balanguingui islands	- 257	—, N.E. entrance	- 366
Balayan bay	- 63, 298	Inaguikan point	- 539
Balung river and Sibetik		Isabela, la	- 250
island, between	228	Kagayan, Rio Grande de	- 529
Banos point	- 690	Kagayanes	- 64
Basilan strait	- 64, 245, 246	Kalamianes and Palawan,	
Basol island	- 419	between	64
Batan port	- 352	Kalantas bank	- 504
Batangas bay	- 63	Kalian point	- 690
Baturua reef	- 207	Kamiguin island	- 496

	Page
Tidal streams:—	
Kamotes islands - - -	63, 412
Kapiz, sea of - - -	356
Karabao and Borokay, be- tween	322
Katanduanes island - - -	588
Kauit point, Mindanao - - -	637
—— strait - - -	412
Kinapuran group - - -	276
—— island - - -	277
Kolasi point, Sebu - - -	386
Labuk river - - -	169
Lahat Datu - - -	194
Laminusa anchorage - - -	270
Ligitan channel - - -	222, 223
—— islet - - -	220
Liloan and Tañon points, between	386
—— point - - -	386
Limasana island - - -	417
Linapakan strait - - -	63, 64
Lubang and Ambili islands, between	34
—— Cabra islands, between	32
—— Golo islands, between	35
Luzon and Tikao, between -	487
——, south coast - - -	473
Maibun bay - - -	266
Malabrigo point - - -	63
Malikut anchorage - - -	293
Mallawallé channel - - -	173
—— to San- dakan	173, 174
Masbate and Mindoro, be- tween	473
—— Samar, between	496
—— Tikao, between	491
Masinglok, port - - -	243
Merlin, trusan - - -	234
Mid-channel bank - - -	278
Miangas island - - -	712
Mindanao, east coast - - -	637
——, west coast - - -	64
——, south coast be- tween Samboanga and Palak	682
Mindoro and Masbate, be- tween	473
Mindoro sea - - -	64
—— strait - - -	63
Misamis port - - -	443
Molokabok island, north of -	370

	Page
Tidal streams:—	
Mompog island and Tuquian point, between	461
—— pass - - -	63
Nasubatta channel - - -	123
Negros island, north end -	64
——, south-east coast	387
North channel - - -	122
Pakiputan strait - - -	702
Palak harbour - - -	682
Paláwan and Kalamianes, between	64
Palmas island - - -	712
Panaon strait - - -	417
Panay and Tablas, between -	356
Panay island, north coast -	63
——, north of - - -	356
——, north-east point	357
Pandanan island - - -	278
Panglao and Sikihor, between	387
Pangutarang, islands N.E. of	292
Punas point - - -	63
Ragay, gulf of - - -	478
Refugio island - - -	378
Romblon and Tablas, between	336
Samar and Masbate, between	496
San Bernardino strait - - -	516
—— Juanico strait - - -	633
—— Vicente port - - -	532
Sandakan harbour - - -	172
—— to Tambisan island	176
Sandugan point - - -	408
Santa Cruz harbour - - -	466
Sarangani islands - - -	690
Sebu island, south-east coast	387, 401
—— port - - -	398
—— sea, south part - - -	410
Sekam island - - -	117
Sentry bank - - -	178
Serudong river - - -	232
Siassi - - -	272
Sibetik island, coal depôt -	232
—— and Balung river, between	228
Sibuko bay - 220, 222, 223,	228
Sibutu island, channel W. of	180, 183, 185
—— passage - 64, 180,	185
Sibuyan and Masbate, be- tween	344, 356
—— Tablas, between	356

	Page		Page
Tidal streams:—		Tides, local:—	
Sibuyan, south-west coast -	356	Aparri - - - -	529
Sikihor and Panglao, between	387	Balambangan, South harbour	131
—— island, N.W. coast -	408	Balanakan, port - -	471
Silam anchorage - - -	199	Balayan - - - -	299
Silapag passage - - -	214	Banguay West channel -	133
Simara and Tablas, between	336	Barren island - - -	88
Simatahan river - - -	233	Barrera, port - - -	492
S. Ubian island, south of -	278	Batan, port, Panay - -	353
Sula channel - - - -	593	Batu Tinagat - - -	228
Sulade and Kakataan,		Bolai, port - - - -	691
between	278	Bondulan point - - -	335
Sulu archipelago - - -	64	Bongao, port - - - -	287
—— islands - - - -	64	Borneo, north-east coast -	141
—— roadstead - - - -	261	Borongan, port - - -	620
—— sea - - - -	63, 64	Busainga, port - - -	480
Surigao strait - - - -	429	Busin, port - - - -	479
Tablas and Panay, between -	356	Busuanga - - - -	56
—— Romblon, between	336	Cherif island - - - -	668
—— Sibuyan, between	356	Cuyo island - - - -	68
—— Simara, between	336	Daláwan bay - - - -	121
Tagolo point - - - -	448	Dalrymple harbour - -	259
Tagum river - - - -	703	Danao river - - - -	377
Tajao point - - - -	64, 385, 387	Dapitan, port - - - -	449
Tambisan island to Dent		Davao - - - -	700
haven	176	Dent haven - - - -	179
Tamuk island, south of - -	255	Dewhurst bay - - - -	142
Tañon and Liloan points,		Dok Kan island - - -	294
between	386	Dumankilas bay - - -	668
Tañon strait - - - -	63, 380, 387	Flat island off Casuarina	
Tapaan passage - - - -	273	point	104
Tapul group - - - -	267	Friedrich haven - - -	226
Tataan - - - -	290	Galera, port - - - -	307
Tawao - - - -	228	Gubat, port - - - -	602
Tayabas bay - - - -	63	Guiuan harbour - - -	628
Teinga Laguit and Teingolan,		Halsey harbour - - -	53
between	251	Homalig island - - -	542
Tikao and Masbate, between	491	Iligan - - - -	439
Tinaka point - - - -	689, 690	Iloilo - - - -	335
Trusan Merlin - - - -	234	Isabela, la - - - -	250
—— Tando Bulong - - -	215	Kabugao bay - - - -	579
Tuquian point and Mompog		—— point - - - -	335
island between	461	Kagayan Sulu - - - -	77
Verde island - - - -	63	Kakub, port - - - -	428
—— passage - - - -	473	Kalandórang bay - -	120
Tide rips, Gem reef to Sibutu		Kalbayok - - - -	519
passage	180	Kapiz bay - - - -	354
Tidepole point, light - -	100	Karandaga islands - -	92
Tides, general - - - -	19	Katbalogan - - - -	523
Tides, local:—		Kinabatangan river -	176
Agusan river - - - -	433	Kudat harbour - - -	145
Alabat, port - - - -	547	Labuk bay - - - -	168
Alice channel - - - -	185	Laguimanok, port - -	459

	Page		Page
Tides local:—		Tides local:—	
Laminusa anchorage - - -	270	Sulu roadstead - - -	261
Lampon, port - - -	543	— sea, wave from China	
Laoang harbour - - -	605	— sea, high water	64
Legaspi - - -	598	—, wave from Pacific,	
Libas, port - - -	617	— high water	64
Maasin - - -	416	Surigao - - -	419
Maibun bay - - -	266	— strait - - -	419
Mallawallé channel - - -	173	Tabako bay - - -	594
Malubutglubut island - - -	60	Tagassan bay - - -	216
Malusa bay - - -	251	Taitai bay - - -	85
Mangarin bay - - -	41	Takloban - - -	632
Mantakwin bay - - -	104	Tambisan island - - -	176
Matnog bay - - -	505	Tapiantana island - - -	255
Mindanao river - - -	683	Tataan - - -	290
Misamis - - -	443	Tawao - - -	228
Mitford harbour - - -	139	Tigabu island - - -	173
Nin bay - - -	346	Tilig, port - - -	33
Observatory (Malubutglubut)		Tinaka point - - -	689
island	60	Tumanao, port - - -	691
Ormok - - -	414	Ubian, South, island - - -	277
Palak - - -	681	Unsang, tanjong - - -	178
Palanog, port - - -	494	Ursula island - - -	111
Palapag, port - - -	607	Tides, Philippines - - -	20, 715
Paláwan, east coast - - -	80	—, tables for finding time	
Pali island - - -	88	— and height of high water	
Paluan bay - - -	37	— at ports in the Philip-	
Pasakao anchorage - - -	477	— pines - - -	716-721
Pearl bank - - -	296	Tiga islet, beacon, shoals - - -	132
Pitogo bay - - -	573	Tigabu island, dangers - - -	158
Princesa, puerto - - -	101	—, tides - - -	173
Pujada bay - - -	643	Tigao, town - - -	637
Putiao, port - - -	482	Tigasamil spit, beacon - - -	144
Ragay, gulf of - - -	478	—, tanjong - - -	143
Romblon, port - - -	339	Tigbaon islets - - -	647
Samboanga - - -	242	Tigbukay bay, point - - -	648
San Bernardino islets - - -	517	Tigburacao islet - - -	647
— Jacinto, port - - -	489	Tigdos islet - - -	638
— Juanico strait - - -	633, 635	Tighowis island - - -	170
— Vicente, port - - -	532	Tiguihan cove, anchorage - - -	312
Sandakan harbour - - -	172	Tigungun island - - -	280
Santa Ana bay - - -	329	Tiji Tiji islets, bank - - -	284
— Cruz harbour - - -	467	Tikala islets, reef east of - - -	672
— Elena - - -	633	Tikao bay - - -	489
— Rita island - - -	635	— to San Rafael point,	
Sebu, port - - -	398	— coast	489
Sekam island - - -	117	— island - - -	487
Siassi - - -	272	— and Masbate	
Sibetik island, coal depôt - - -	232	— passages between	489
Sibutu island - - -	180, 185	—, directions	491
Silam anchorage - - -	199	—, tidal streams	491
South harbour, Balambangan	131	Tikauan point - - -	658
— Ubian island - - -	277		

	Page		Page
Tiklin island, Luzon - - -	505	Tintiman islet, anchorage -	407
—— islet, Negros - - -	377	——, shoals off -	407
——, point, Mindoro - - -	314	Tinuibo islet - - -	403
—— reef - - -	377	Tirana rock - - -	255
——, strait - - -	504	Tiwi point and church -	593
Tiktauan channel - - -	243	——, bank south-east of,	
—— island, anchorage off	242	clearing mark	593
Tikul island, rock off - -	293	Tokhani point - - -	291
Tikus, pulo - - -	168	Toledo, town - - -	385
Tilig, port, anchorage, buoys,		Tolen point - - -	270
supplies, tides	33	——, shoals off - - -	271
Timako hill, island - - -	683	Tolibas village - - -	188
Timba Timba islet - - -	205	Tolon, anchorage off, town	374
Timbo river - - -	707	—— Pisa, island - - -	254
Timbu Mata island - - -	209	Tolosa, town - - -	635
——, anchorage		Temasa islet, Biliran -	501
west of	211	——, Talahit - - -	497
——, tanjong - - -	209	Tominongtong point, rock off	586
——, anchorage		Tomonton point, shoal, buoy	
near	210		365, 371
——, water - - -	210	Ton Eguet point - - -	256
Timbungan island - - -	254	—— Kanutyajan point -	77
Time signals - - -	7	Tongo point - - -	409
Time, standard, British North		Tong-Tong bank - - -	263
Borneo	10	Tonkil island - - -	256
——, Philippines - - -	7	——, off-lying shoal	
Timpasan island - - -	521	south-east of	257
Tina Basan island - - -	237	—— point - - -	639
——, trusan - - -	237	Torongshok islet - - -	168
Tinaan, anchorage, village	399	Torrijos bay, directions -	469
—— point - - -	399	——, town - - -	469
—— to Argao point, coast	400	Totoog point, light - - -	506
Tinaga island - - -	552	Toytoy point - - -	577
Tinagbud river, anchorage off	477	Transept hill - - -	120
Tinagondaget inlet - - -	355	Trapichikan point - - -	465
Tinahuagan point - - -	568	Traverse island - - -	230
—— to Yopokit		Treacher, trusan - - -	215
point, coast	570	Tree rock - - -	166
Tinaka point, anchorage near	689	Trepang island - - -	90
——, tides, tidal		Tres Reyes islets, Kulion -	58
streams	689, 690	——, reefs eastward	
Tinakos islet - - -	484	of	58
Tinakta island - - -	289	——, los, islands,	
Tinalisayan islets - - -	478	Marinduque	472
Tinaogan, reef north-east of	378	——, mount - - -	665
Tinambak, town - - -	563	Triton island - - -	666
Tinang islet - - -	337	—— rocks - - -	637
Tinau island - - -	510	Trueno shoal - - -	531
Ting-kaiu river - - -	200	Trusan Bongao island -	285
Tinitian, town - - -	95	——, passage - - -	286
Tinkalan islet - - -	269	—— Duyon - - -	169
Tinkansan islet - - -	501	—— Merlin - - -	234
Tinorian river - - -	365	—— Sigalong - - -	210
		—— Tando Bulong - - -	215

	Page		Page
Trusan Tando Bulong, beacons,		Tumajabun point - - -	251
depths, tidal streams	215	Tumalaytay islet - - -	345
_____, directions	216, 217	Tumalung bay, anchorage	662
_____ Tina Basan - - -	237	_____, water - - -	662
_____ Treacher - - -	215	Tumanao port, anchorage,	
Tuad islet, shoal eastward of	353	_____ water	691
Tub Bataha reefs - - -	72	_____, tide - - -	691
_____, South, reef - - -	73	Tumango, port - - -	635
Tubabao island - - -	612	Tumbukan islet - - -	284
_____, anchorage - - -	613	Tumindao islet - - -	182
_____, channel within	612	Tuna bay - - -	687
Tubalan head - - -	692	_____ to Pola point, coast	687
_____ to Kolapsin		Tundalara, mount - - -	50
point, coast	692	Tunganan bay, anchorage	648
_____, port, anchorage - - -	692	Tunku point - - -	189
Tubay, mount, town - - -	431	_____, caution - - -	189
Tubig point - - -	458	_____ river - - -	189
_____ river - - -	615	Tupilak hill - - -	651
_____ to Taig point, coast	615	Tuquian point - - -	461
Tubigan island, water - - -	292	_____ and Mompog	
_____ point - - -	617	island, tidal streams between	461
Tubile point, reefs - - -	37	_____ to Ahus point,	
Tubingatan point - - -	264, 265	coast	461
Tubotubo islet - - -	686	Turia rock, buoy - - -	363
Tubud point - - -	449	Turner patch, clearing mark	190
Tuburan bay, directions, shoal	384	Turret island - - -	49
_____ river, town - - -	384	Tutop, tanjong - - -	217
Tudela anchorage, Mindanao	444	_____ to Delconté	
_____, town, Poro		point, coast	217
island	411	Tutu bay - - -	266
Tuft islet - - -	98	_____, anchorage - - -	267
Tuganay river - - -	703	Twins, islets - - -	421
Tugapangan point - - -	680	Two-fathoms shoal, Taitai bay	86
Tugas point, Lapinin island	403	Typhoon harbours,	
_____, Mindanao - - -	636	483, 531, 535, 536, 565,	611
Tugasan point - - -	615	_____ signals, see Signals.	
Tugbugun river - - -	486	Typhoons - - -	12-15
Tugnanang, village - - -	712	_____, Philippine islands - - -	3
Tugnug point - - -	621, 622	_____, practical rules - - -	16
Tugubun point - - -	641	_____, warnings of	
Tuka bay, village - - -	676	approach	15
Tukapanga point - - -	689	Uaidajon islet - - -	358
Tukat reef - - -	355	Uala islands - - -	541
Tuk Tuk point - - -	260	Uanivan islet - - -	642
Tukuran, anchorage - - -	674	Uban point, beacon off - - -	633
_____ river - - -	674	Ubian, North, island - - -	293
Tulian island, Sulu, N. coast,		_____, South, island,	
_____ water	259	anchorage, tides	277
_____, W. coast - - -	262	Ugamut island - - -	512
Tulnalutan island - - -	243	Ulan point - - -	471
Tuludan river - - -	671	Uling, coal mine - - -	400
Tulunanaun islet, rock off	357	Ultra islet, caution - - -	282
Tumadgo point - - -	643		

	Page		Page
Ulugan bay - - -	96	Vigia point to Taytay point, coast	635
Ulut river - - -	615	-----, to Masbate - - -	495
Umanun point - - -	638	Vilanvilan island - - -	243
----- to Bankulin point, coast	638	Village bay - - -	102
Umbakanan river - - -	695	----- rock - - -	100
Umirey river - - -	538	Villalobos reef - - -	515
Unamao islet - - -	637	Villamil rock - - -	266
Unarang rock - - -	236	Viñas river - - -	475
Ungay point, light - - -	591	Vintikayan point - - -	586
Uniform system of buoyage, Philippines	28	Viola reef - - -	124
Union, la, village - - -	708	Virak bank - - -	578
----- reef - - -	540	-----, church - - -	578, 579
Unip group, island - - -	420	-----, point - - -	578
Unisan islets - - -	330	-----, town, anchorage off - - -	579
-----, town - - -	460	Viri island - - -	509
Unsang peninsula - - -	186, 188	Visayan islands - - -	2
-----, tanjong - - -	174, 178	Vitali point - - -	646
-----, tides - - -	178	-----, rock off - - -	647
Urai Vanoa rocks - - -	520	----- to Linguisan point, coast	648
Ursula island, dangers - - -	111	Vitaogan point - - -	585
-----, tides - - -	111	Volcanoes 269, 436, 598, 602, 682, 690	
Usada island - - -	294	Voorwyk reefs, beacons - - -	192
Uson bay, town, Masbate - - -	494		
----- island, dangers - - -	54		
-----, port, Busuanga, anchorage	56		
Usucan shoal - - -	447		
Utabe bay - - -	486		
Uwaan island - - -	295		
Vallehermosa, shoal off - - -	378	Wakefield shoal - - -	111
Valparaiso shoal - - -	74	Walker shoal - - -	629
Vanguardia island - - -	60	Walton reef - - -	212
Varadero bay, anchorage - - -	308	Wanderer bank, N.W. of	
----- point - - -	308	-----, Kagayan Sulu	155
Variation, abnormal - - -	346	----- reef, Silam - - -	196
Vela bank - - -	314	----- shoal S.W. of	
Verde island - - -	302	-----, Kagayan Sulu	156
----- passage, directions	312	Want of surveys - - -	1
-----, tidal		Water, fresh:—	
----- streams 63, 297, 473		Alabat, port - - -	547
----- to San Bernardino strait, winds	515	Apiton cove - - -	363
Verde (Signal) island - - -	82	Baganga bay - - -	640
Vice-Consuls, British, Iloilo - - -	333	Barrera, port - - -	492
-----, Sebu - - -	397	Biliran island - - -	501
Victoria peak - - -	102	Binigian point - - -	374
Victorias, town - - -	371	Bislig - - -	639
Vigia, mount, Bongao - - -	286	Bivouac point - - -	104
-----, Masbate - - -	349	Bolobolo - - -	384
----- point, Leite - - -	629	Buenavista, Guimaras - - -	328
		Busin, port - - -	479
		Daláwan bay - - -	121
		Danao river - - -	377
		Dos Amigos, port - - -	291
		Dumanhug - - -	386
		Dupon, port - - -	500

	Page		Page
Water, fresh:—		Water, fresh:—	
Gabó, port - - -	422	Sulu - - -	262
Gaia, pulo - - -	206	Table head, S.W. of - -	102
Glan river - - -	688	Taitai bay - - -	85
Halsey harbour - - -	53	Takbolubo - - -	107
Ilin village - - -	42	Tambiluanga island - -	282
Iloilo - - -	333	Tataan - - -	290
Isabela, la - - -	250	Timbu Mata, tanjong - -	210
Kagayan Sulu - - -	76	Tubigan island - - -	292
Kajidiokan point - - -	340	Tulian island - - -	259
Kalandorang bay - - -	119	Tumalung bay - - -	662
Kasauman point - - -	641	Tumanao, port - - -	691
Kasiguran bay - - -	537	Watson ridge - - -	232
Kauit point, Bantayan - -	383	Wawa river - - -	30
Kiualan anchorage - - -	439	Weather, Mindoro strait - -	47
Kraan river, east of - - -	687	——, Tawi Tawi - - -	288
Kulion, port - - -	56	——, <i>see</i> Winds and weather.	
Kumalarang village - - -	666	Webb shoal - - -	219
Lahat Datu - - -	194	Wedge island - - -	89
Lalauigan bay - - -	44	West bank, St. Michael islands	75
Lapak - - -	273	—— Circe shoal - - -	658
Lebak river - - -	686	—— Dilasak bay, anchorage -	536
Liang bay - - -	638	—— islet, Mallawallé - -	153
Lug, port - - -	321	—— point, Balábac - - -	119
Mansalai bay - - -	314	——, Clarendon bay - - -	121
Mantakwin bay - - -	104	Western channel, Tawi Tawi -	291
Matlang bay - - -	500	—— shoals, Balábac - - -	118
Mauban - - -	544	Whale rock - - -	636
Mauo river - - -	508	Wheeling peak - - -	537
Mitford harbour - - -	139	White islet - - -	92
Mutul river - - -	688	——, passage, Dalrymple	
Nin bay - - -	345	harbour	259
North harbour - - -	130	——, rock, Cuyos - - -	70
Palapag, port - - -	606	——, Daláwan bay - - -	121
Pali (Barren) island - - -	88	——, Kiniluban islands - -	65
Palompon, port - - -	499	——, Kudat harbour - - -	143
Paluan bay - - -	37	——, Libarran island - - -	166
Panabutan bay - - -	453	——, Sibuguey bay - - -	647
Pandannan island - - -	113	——, S. Taitai island - - -	87
Polarikan - - -	84	—— rocks, Silam harbour -	196
Princesa, puerto - - -	102	Wicks rock - - -	228
Relief point - - -	105	Wilhelmina rock - - -	253
Romblon port - - -	339	Willcox bank - - -	78
Saley point, north of - - -	543	Winds, Balayan bay - - -	298
Samboanga - - -	241	——, Luzon, east coast - -	588
San Jacinto, port - - -	489	——, south coast - - -	473
Sandakan - - -	172	——, Mindanao, north coast -	451
Santa Maria, port - - -	452	——, Palak harbour - - -	681
Sebu, port - - -	397	——, Samboanga - - -	242
Sisiran bay - - -	568	——, Sulu sea - - -	62
Soguikay bay - - -	315	——, Surigao strait - - -	425
Sorsogon, port - - -	485, 486	——, Tawi Tawi - - -	288
South harbour - - -	131	——, Verde island passage	
Sula port - - -	598	to San Bernardino strait	515

	Page		Page
Wind and weather, Borneo,		Yangaba islets - - -	426
N.E. coast 11, 12	12	Yellow rock - - -	540
Celebes sea 12	12	Yog point - - -	574
Darvel bay - 187	187	bank east-north-east	
general		of 579	
remarks 10, 12	12	to Bugao point,	
Luzon,		coast 580	
S.W. coast 10	10	Yopokit point - - -	572
Sulu sea - 11	11	to Karamuan	
Wireless telegraph, Malabang - 679	679	point, coast 572	
Samboanga 241	241	Yucatan anchorage - - -	641
Sulu - 261	261	Yuisan point - - -	401
Witti rock - - - - 143	143	to Oslob point,	
Woodhall reefs - - - - 196	196	coast 401	
Woody island and coast to		shoal - - - - 401	
Marudu river 146	146		
Wreck bay - - - - 92	92	Zapato Mayor, islet - - -	356
Wright shoal, Paláwan - - 111	111	Menor, islet - - -	356
Samar - - - - 513	513	Zau islet - - - - 295	
Wüllerstorf, mount - - - 218	218	Zayao island - - - - 586	
Wyatt, mount - - - - 201	201	Zebra reefs - - - - 149	
		Zumarraga - - - - 525	

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